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Chili plant response to the concentration of neem leaf fermentation and banana hump

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Abstract
*The purpose of this study was to determine the growth and production of chili (*Capsicum annuum *L.) Plants in the concentration of fermented neem leaves and banana hump varieties. The research took place from March to July 2019 in the Gapoktan Repeh Rapih Garden, Sukamantri Village, Tamansari District, Bogor Regency, and West Java. The study used factorial randomized block design (RBD) consisting of two factors, namely, the concentration treatment of neem leaf fermentation and various banana varieties of tubers. The concentration of neem leaf fermentation used consists of four levels, namely: 1). M0 = 0% (Control), 2). M1 = 15% (15 ml neem + 85 ml water), 3). M2 = 30% (30 ml neem + 70 ml water), M3 = 45% (45 ml neem + 55 ml water). Banana weevil consists of three varieties, namely: Ambon, kepok, and horn with a concentration of 30% (30 ml + 70ml water). The results showed that the treatment of various varieties of banana hump had an effect on the variables of stem diameter, number of leaves, crown width, and fruit length, but did not affect the number of fruits, fruit weight, fruit diameter, and weight of chili plants. The concentration of neem leaf fermentation M3 (45%) influences the intensity variable of aphids. Based on the results of this study, the concentration of neem leaf fermentation and banana hump varieties also have the potential to be applied in research locations throughout Indonesia with the same growing requirements.*
Keywords: *banana hump; chili plants; fermentation concentration; neem leaves.*

1. Introduction

Chili (*Capsicum annuum* L.) is a horticultural commodity which is one of the most important and commercially cultivated plants. Chili has many benefits as herbs and spices because it has a distinctive aroma, spicy taste, and a specific color. Chili has an important content, namely capsaicin, which is useful to relieve pain and has anticancer activity. The food industry, chili can be processed into a variety of processed foods, so it has high commercial value [1], [2]. Rapid population growth causes the need for chili consumption to increase. Chili production has not been able to meet the demands and needs of consumers [3]. The development of chili commodities in Indonesia increased from 2010 to 2014 in a row that was 888,852 tons, 954,363 tons, 1,012,879 tons, 1,072,977 tons. Chili production decreased by 2.74% in 2015. In 2016 it increased by 0.04% compared to 2015 (BPS 2016). In July 2017, the price of chili in the domestic market decreased, while in August 2017, it increased by 1.11%. Nationally, chili prices for August 2016 to August 2017 are not stable based on the high coefficient of diversity (KK) of 29.54%. In August 2017, in particular, the national average daily COW rate was relatively low at 3.65% (Ministry of Trade 2017).

The low production of chili is influenced by several factors, including pest and disease attacks. According to [4], one of the pests that attack the chili plant is Aphis gossypii, which can be found on the leaf blades, twigs, branches, stems, and stems of the host plant fruit. This causes the pepper leaves to shrink and curly, then turn yellow and wither. The A. gossypii colonies in the shoots result in rolling of the shoots of the edge buds, while other production decreases due to agronomic factors and disease [5].

The use of chemicals continuously is a major problem for farmers, as the costs are relatively expensive, and causes crop yields that contain chemical residues. [6] explained that the use of plant-based pesticides is one alternative to deal with pest and disease attacks that are environmentally friendly and safe for human health. One of the plants that can be used as a

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vegetable pesticide is neem. Neem leaves have the potential to be plant-based pesticides because they contain compounds azadirachtin, salanin, Nimbin, and meliantriol [7].

The growth of chili plants can be supported by the use of natural growth regulators (ZPT) derived from banana weevil. Banana weevil can be used as compost, liquid fertilizer, nutrient decomposes, and growth regulators. The contents contained in banana weevil are gibberellins and cytokines and contain six microorganisms, namely Azospirillium, Azotobacter, Bacillus, Aeromonas, Aspergillus, and phosphate solvent microbes that are useful for plants. Based on the description above, the use of neem leaves as a vegetable pesticide and banana weevil as a natural growth regulator can increase the growth and yield of chili plants.

2. Research Methods

The study used a factorial randomized block design (RCBD) consisting of two factors, namely the concentration treatment of neem leaf fermentation and banana hump varieties. The concentration of neem leaf fermentation used consists of four levels, namely M0 = 0% (control), M1 = 15% (15 ml / 85 ml water), M2 = 30% (30ml / 70 ml water), M3 = 45% (45ml / 55 ml water). A variety of tubers consist of three banana varieties, namely Ambon, kepok, and horn. The fermentation concentration used was 30% (30 ml / 70 ml). Granting the Kepok banana fermentation concentration of 30% showed the best results on the growth of red okra (Maria 2018). The experiment had 12 treatment combinations with 3 replications, so there were 36 experimental units. Each experimental unit consists of 3 observation units so that there are 108 observation units. The research treatments are as follows:

M0A: 0% neem + POC 30% ambon tuber (neem 0 ml / 100 ml water + POC ambon 30 ml / 70ml water)
M1A: 15% neem + POC 30% ambon tuber (15 ml / 85 ml neem + POC ambon tuber 30 ml / 70ml water)
M2A: 30% neem + POC 30% ambon tuber (30 ml mimba / 70 ml water + 30 ml / 70ml ambon tuber POC)
M3A: mimba 45% + POC 30% ambon weevil (mimba 45 ml / 55 ml water + POC ambon 30 ml / 70ml water)
M0K: 0% mimba + POC tuber 30% (mimba 0 ml / 100 ml water + POC tuber 30 pcs / 70ml water)
M1K: 15% neem + POC 30% tuber knob (neem 15 ml / 85 ml water + POC tuber 30 ml / 70ml water)
M2K: 30% mimba + POC 30% tubers (mimba 30 ml / 70 ml water + POC 30 pcs / 70ml pump tubers)
M3K: mimba 45% + POC tuber 30% (mimba 45 ml / 55 ml water + POC tuber 30 cm / 70ml water)
M0T: 0% neem + POC 30% tuber horn (mimba 0 ml / 100 ml water + POC horn 30 ml / 70ml water)
M1T: 15% neem + POC 30% tuber horn (neem 15 ml / 85 ml water + POC horn 30 ml / 70ml water)
M2T: 30% neem + POC 30% tuber horn (neem 30 ml / 70 ml water + POC horn 30 ml / 70 ml water)
M3T: 45% neem + POC 30% tuber horn (neem 45 ml / 55 ml water + POC horn 30 ml / 70ml water)

[8] a statistical model for factorial experiments with a randomized block design (RCBD) is as follows:

$$Yijk = \mu + \alpha_i + \beta_j + \rho_k + (\alpha\beta)_{ij} + \varepsilon_{ijk}$$

Information:

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Yijk = Observation of the growth of chili plants in the k-group receiving A-i level treatment from the concentration factor of neem leaf fermentation and B-level treatment of the various factors of banana weevil varieties
μ = General average value of chili growth
αi = Effect of treatment on the concentration of the neem leaf solution to the -I level
βj = Effect of various treatments on banana varieties of the -j level
ρk = Effect of the k-th group
(αβ) ij = Effect of i-level interaction on the concentration of neem leaf solution and its level
Ɛijk = Error component

According to [8] the statistical model for factorial experiments with randomized block designs (RCBD) is as follows:

$$Y_{ijk} = \mu + \alpha_i + \beta_j + \rho_k + (\alpha\beta)_{ij} + \varepsilon_{ijk}$$

Information:
Y_{ijk} : Observation of chili plant growth in the k-group receiving A-i level treatment from the concentration factor of neem leaf fermentation and B-j-level treatment of factors of various varieties of the banana hump.
μ : The general average value of chili growth
α_i : The effect of the treatment on the level of fermentation of neem leaf i
β_j : The effect of the treatment of various banana hump varieties to the jth level
ρ_k : The influence of the k-th group
$(\alpha\beta)_{ij}$: The effect of the interaction of the i-level fermentation of neem leaf and the j-level of various banana hump varieties
ε_{ijk} : Error component

The data obtained were analyzed using variance (F test) at a 5% level. The treatments that significantly affected were further analyzed by the Duncan Multiple Range Test (DMRT) at the 5% level.

2.1 Research Implementation

The research carried out, namely land management and preparation of planting media, planting, maintenance, manufacturing of neem leaf solution, making natural growth regulator substances for banana weevil, and harvesting.

2.1.1. Land Management and Planting Media Preparation.

The planting media used are soiled, husk charcoal, and manure with a composition of 2: 1: 1 for seeding. Soil sifting is done so that rocks, gravel, and other impurities can be separated to get a good planting medium. A 5 cm x 12 cm polybag filled with a planting medium mixture is moistened and planted one seed per planting hole. The filled poly bags are arranged and stored in a place that is protected from direct sunlight. Giving Furadan has done after the plant is ± 5 days old with a dose of 4.2 g. After the plant has a minimum age of 21 days and has formed 4-5 leaves of the plant are ready for transplanting.

2.1.2 Planting.

The polybag with 40 cm x 45 cm is used for planting media. Growing media are soil and manure, with a ratio of 15 kg soil weight and 1120 g manure. Transplanting is done in the morning with a spacing of 60 cm x 50 cm between poly bags. Replanting is done seven days after transplanting (DAT).

2.1.3 Fertilizing.

Basic fertilization is done one-time age 0-7 days before planting with a third dose of each dose N (100-200 kg/ha), P (80 kg/ha), and K (100-200 kg/ha) and two subsequent fertilization times at the age of 30-35 days and 40-50 days after planting each one-third dose.

2.1.4 Maintenance.

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Maintenance is carried out by manually cleaning weeds every week around planting, and watering is done conditionally in the afternoon using a measuring cup or embrace.

2.1.5 Making Neem Leaf Fermentation.

Neem leaves are used as a natural pesticide in the form of a solution. Making a neem leaf solution is done by pounding fresh leaves weighing 300 g / ℓ water—the time needed for the preparation of the solution until administration to plants 1 x 24 hours. Neem leaf solution is used to make concentrations of 15%, 30%, and 45% as a treatment. Each concentration was dissolved in 100 ml of water and stirred evenly [9].

2.1.6 Making natural ZPT Banana Hump.

Banana humps used are varieties of banana kepok, ambon, and horn. The weight of each tuber is 3 kg. The weevil is washed using water and then chopped into small sizes and dissolved in a mixture of rice water as much as 10 kg and brown sugar as much as 1 kg for each variety of tubers. Banana weevil kept for about 15 days (Maria 2018).

2.1.7 Harvesting.

Harvesting begins when the plant is around 70 days after transplanting (DAT), manually picked. The criteria for chili that is ready to be harvested is a round fruit that has been filled. Harvesting is done three times in harvesting.

2.1.8 Observed variables.

The observed variable is plant height (cm), rod diameter (cm), Number of leaves per plant, The number of leaves affected by aphids, Number of branches per plant, Head width, Number of fruits per plant, Weight of chilies per plant (g), Fruit length (cm) and fruit diameter (cm), Wet roots and plant canopy weight, Dry weight of roots and canopy of plants.

3. Results and Discussion

3.1 General Circumstances

The study lasted for five months, from March to July 2019, the minimum temperature ranged from 21.3 – 23.2 0C and the maximum temperature ranged from 31.6 – 32.9 0C and average temperature 25.7 – 27.1 0C, average rainfall – between 52.4 – 565 mm and humidity N Air ranged between 77.2 – 85.5% (BMKG 2019) (e.g., Table 1).

Table 1. Environmental Conditions during the Research (March – July 2019)

Parameters	March	April	May	June	July
Tn: Minimum temperature (°c)	22.8	22.9	23.2	21.9	21.3
Tx: Maximum temperature (°c)	31.6	32.7	32.9	32.7	31.9
Tavg: Average temperature (°C)	25.9	26.5	27.1	26.4	25.8
RH_avg: Average humidity (%)	85.5	85.0	81.3	80	77.2
RR: Rainfall (mm)	230,8	565.0	236,7	137,5	52,4
Sun Illumination Length (clock)	4.00	6.00	8.00	8.00	8.00
Average wind speed (m/s)	1.00	1.00	1.00	1.00	1.00

Source: Meteorological and Geophysical Agency (2019)

3.2 Results

3.2.1 High Crop.

The concentration treatment of Mimba leaf fermentations and various humps of banana varieties have no real effect on the height at 14 to 49 days after transplanting (e.g. Table 2).

Table 2. High Average Chili Pepper Plant 14 – 49 Days after Transplanting (DAT)

Treatment	Plant height (cm)					
	14 DAT	21 DAT	28 DAT	35 DAT	42 DAT	49

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						DAT
N (Neem)						
N0 (control)	15.90	23.66	29.95	36.21	39.66	41.14
N1 (15%)	15.25	22.44	28.27	35.80	40.81	43.16
N2 (30%)	16.47	23.51	29.99	36.17	40.24	42.50
N3 (45%)	16.87	24.30	29.93	35.40	39.02	41.57
BH (Banana Hump 30%)						
Ambon	15.59	23.28	29.38	35.86	39.90	42.70
Kepok	16.72	23.37	29.47	35.19	39.39	41.60
Tanduk	16.05	23.78	29.75	36.63	40.51	41.98

Note: The average value in the same column, followed by the same letter, is not significantly different according to the DMRT test at a 5% level. N = Mimba; BH = Banana hump

3.2.2 Number of Plant Leaves.

The number of leaves of chili plants treated with banana varieties of horn significantly affected 49 HSPT but did not significantly affect the concentration of neem leaf solution treatment. The highest average number of leaves in the horn banana hump (e.g., Table 3).

Table 3. Average Number of Leaves Of Chili Plants 14 - 49 Dat

Number of leaves (sheet)						
Treatment	14 DAT	21 DAT	28 DAT	35 DAT	42 DAT	49 DAT
N (Neem)						
N0 (Control)	5.70	8.59	17.85	33.85	47.41	67.04
N1 (15%)	5.74	8.48	15.85	31.67	47.44	68.85
N2 (30%)	6.15	8.44	19.00	32.52	46.11	64.52
N3 (45%)	5.63	8.70	16.93	31.19	48.15	68.67
BH (Banana Hump 30 %)						
Ambon	5.89	8.44	17.17	30.69	47.33	65.83^{a}
Kepok	5.61	8.78	17.39	32.50	44.44	63.61^{a}
Tanduk	5.92	8.44	17.67	33.72	50.06	72.36^{b}

Note: The average value in the same column, followed by the same letter, is not significantly different according to the DMRT test at a 5% level. N = Mimba; BH = Banana hump.

3.2.3 Intensity of Aphids.

The treatment of neem leaf concentration of 14 - 42 HSPT significantly affected the intensity of aphids, but did not significantly affect the treatment of various banana hump varieties. The lowest pest attack rate was on the M3 (45%) (e.g., Table 4).

Table 4. Average Intensity of Aphids 14-42 DAT

Treatment	Aphids attack (%)				
	14 DAT	21 DAT	28 DAT	35 DAT	42 DAT
N (Neem)					
N0 (control)	52.82^{d}	38.69^{c}	25.78^{c}	7.16^{c}	4.94^{c}
N1 (15%)	42.62^{c}	30.97^{b}	20.92^{bc}	5.71^{b}	3.78^{b}
N2 (30%)	36.35^{b}	27.12^{b}	17.75^{ab}	5.16^{b}	3.55^{b}
N3 (45%)	30.52^{a}	20.24^{a}	13.83^{a}	3.70^{a}	2.56^{a}

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BH (Banana Hump 30%)					
Ambon	40.51	30.92	21.11	5.66	3.98
Kepok	41.17	27.18	18.79	5.46	3.78
Tanduk	40.05	29.70	18.81	5.18	3.37

Note: The average value in the same column, followed by the same letter, is not significantly different according to the DMRT test at a 5% level. N = Mimba; BH = Banana hump

3.2.4 Number of Plant Branches.

The number of chili branches did not show any significant effect on the treatment of the concentration of neem leaves and various tuber varieties of banana varieties (e.g., Table 5).

Table 5. The Average Number of Branches of Chili Plants Is 14 - 42 DAT

Treatment	Plant branches				
	14 DAT	21 DAT	28 DAT	35 DAT	42 DAT
N (Neem)					
N0 (control)	1.56	6.89	28.37	36.63	32.26
N1 (15%)	1.85	6.74	32.44	40.44	34.30
N2 (30%)	2.00	8.07	29.70	38.37	33.41
N3 (45%)	1.93	7.78	28.44	33.89	24.52
BH (Banana Hump 30%)					
Ambon	1.50	7.44	28.33	34.94	31.86
Kepok	1.89	7.00	28.39	35.42	28.33
Tanduk	2.11	7.67	32.50	41.64	33.17

3.2.5 Headline crop width.

The treatment of various banana hump varieties significantly affected the variable width of the chili canopy, but did not significantly affect the concentration of neem leaf fermentation treatment. The average of the widest crowns on tuber varieties of banana horns aged 35 HSPT and tuber varieties of Ambon bananas aged 56 HSPT (e.g., Table 6)

Table 6. Average Width of Plant Canopy 28 - 56 DAT

Treatment	Headline width (cm)				
	28 DAT	35 DAT	42 DAT	49 DAT	56 DAT
N (Neem)					
N0 (control)	24.41	29.25	35.34	38.26	38.57
N1 (15%)	23.09	28.95	32.90	36.29	40.84
N2 (30%)	24.91	30.98	35.21	37.30	39.39
N3 (45%)	24.41	29.22	33.48	35.15	35.57
BH (Banana Hump 30%)					
Ambon	23.83	29.53[ab]	34.31	36.42	40.68[b]
Kepok	24.85	28.22[a]	32.79	35.96	35.86[a]
Tanduk	23.94	31.05[b]	35.60	37.86	39.25[ab]

Note: The average value in the same column, followed by the same letter, is not significantly different according to the DMRT test at a 5% level. N = Mimba; BH = Banana hump.

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3.2.6 Number of Chilies.
The concentration of neem leaf fermentation and various banana varieties of tuber did not significantly affect the number of chili fruit 28-49 (e.g., Table 7).

Table 7. The Average Number of Fruit Plants Is 28 DAT - 49 DAT

Treatment	The number of fruit plants			
	28 DAT	35 DAT	42 DAT	49 DAT
M (Mimba)				
M0 (control)	5.59	5.89	6.96	7.56
M1 (15%)	5.59	5.89	6.96	7.81
M2 (30%)	6.26	6.33	7.04	7.85
M3 (45%)	6.22	6.59	7.26	8.07
HB (Hump Banana)				
Ambon	5.81	6.11	6.86	7.69
Kepok	5.50	5.50	6.83	7.36
Tanduk	6.44	6.92	7.47	8.42

3.2.7 Weight of Chili.
Treatment of the concentration of neem leaf fermentation and various varieties of banana hump has a significant effect on the weight chili variable in total harvest. The average weight of chili. The average total harvest of treatment of neem solution was highest in M2 (30%), while the average total harvest of treatment of banana weevil varieties was highest in tuber varieties of horn bananas (e.g., Table 8).

Table 8. Average Weight of Chili Crop Harvest

Treatment	Harvest 1	Harvest 2	Harvest 3	Total harvest
N (Neem)				
N0 (control)	33.61	29.56	22.22	82.11[bc]
N1 (15%)	25.22	24.17	24.00	50.44[a]
N2 (30%)	32.56	34.33	26.11	86.89[b]
N3 (45%)	21.22	29.67	25.44	67.22[ab]
HB (Hump Banana 30%)				
Ambon	29.92	28.75	25.75	74.83[b]
Kepok	22.21	26.17	21.83	59.75[a]
Tanduk	32.33	33.38	25.75	80.42[b]

Note: The average value in the same column, followed by the same letter, is not significantly different according to the DMRT test at a 5% level. N = Mimba; BH = Banana hump.

3.2.8. Length and Diameter of Chili.

Treatment of banana hump varieties was significantly larger and affected the fruit length variable but did not significantly affect the fruit diameter variable and the treatment of neem leaf concentration (e.g., Table 9).

Table 9 Average Length and Diameter Of Chili Plants

Treatment	The length and diameter of the fruit	
	Fruit Length	Fruit Diameter (cm)

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	(cm)	
N (Neem)		
N0 (control)	10.56	1.03
N1 (15%)	10.02	1.01
N2 (30%)	10.39	1.03
N3 (45%)	10.19	1.08
BH (Banana Hump 30%)		
Ambon	10.71[b]	1.03
Kepok	9.79[a]	1.05
Tanduk	10.37[b]	1.03

Note: The average value in the same column, followed by the same letter, is not significantly different according to the DMRT test at a 5% level. N = Mimba; BH = Banana hump

3.2.9. The wet and dry weight of plants.

The concentration treatment of mimba leaves and various cuffs banana varieties do not show any noticeable effect on wet and dry weight change plant roots and headers (e.g., Table 10).

Table 10 Average Wet and Dry Weight Of Chili Pepper Plants

Treatment	Chili Crop Harvest Weight			
	Wet-weight root (g)	dry root weight (g)	wet-weight heading (g)	Header dry weight (g)
N(Neem)				
N0 (control)	6.63	3.15	30.67	14.85
N1 (15%)	7.26	3.41	33.19	15.74
N2 (30%)	8.00	3.56	34.85	15.89
N3 (45%)	8.22	3.74	34.59	15.67
Banana Hump				
Ambon	6.75	3.06	32.56	15.11
Kepok	7.69	3.56	32.14	15.03
Tanduk	8.14	3.78	35.28	16.47

3.3. Influence of banana Hump concentration

The treatment of various humps banana varieties does not show a noticeable difference in plant height. It is suspected that the cuffs with various varieties of bananas have nutrient content, microbes, the parser organic matter, and growth Regulator (ZPT) naturally relatively equal, then the three cuffs banana varieties can be used as natural ZPT in pushing Plant growth. The existence of Microbial as a biological fertilizer is needed by plants for availability and nutrient solubility, which plays a role in encouraging the growth and improvement of yield [10]. Nutrient content in ZPT natural hump such as N, P, K, Ca, and Mg causing the occurrence of synthesis and division of cell walls, thereby triggering the vegetative growth, especially high stem plant [11].

The Diameter of the chili plant that was given the treatment of hump banana varieties is relatively higher than the treatment of the Hump banana varieties Ambon and other Saba from the age 21-42 HSPT. At the age of 49 hspt, the diameter of the chili plant with the treatment of hump varieties of the real banana horn is greater than with other treatments. It is suspected the cuffs of varieties of the banana horn can provide nutrients better than the cuffs of banana varieties Ambon and Kepok. [12] States that sufficient and balanced nutrient availability can

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optimize crop growth. Macronutrients are relatively more needed by plants, including N, P, K, S, and Mg. Nitrogen is the main driving element in crop growth. Nitrogen plays a role in the formation of vegetative parts of plants such as leaves, stems, and roots. However, the amount of N is too high can inhibit the fertilization of plants. The benefit of nitrogen in plant growth contributes to the vegetative phase of one of the plants in the stem diameter [13].

The average number of chili pepper leaves with the provision of various hump banana varieties relative no different really, but the number of leaves with the treatment of the spat of banana varieties of horns at the age of 49 hspt real more than other treatment. It is suspected that the cuffs of varieties of banana horns have more nutrient content than the banana hump Ambon and Kepok. Also, the number of leaves in the treatment of hump varieties of banana horns can be influenced by the location of the plant gets more optimal sunlight, so the process of photosynthesis lasts well. [14] States that the essential compounds needed in the formation of leaves and chlorophyll in the leaves are nitrogen.

The width of the title of chili Pepper plants with the introduction of the real banana horn varieties bigger than the banana Kepok, the width of the heading on the 35, and 56 HSPT treatment of the banana hunk Ambon and the real horn is bigger than the banana cuffs Saba. [15] Stated that the banana's cuffs contain macro and micronutrients complete so that they can be used as an additional nutrient source for other crops. The availability of nutrients is important so that the plant can grow and develop optimally, especially the availability of nitrogen nutrients (N). N Nutrient is an essential macronutrient that plays a role in vegetative phases of plants such as plant elevation, an increase in the number of leaves, and the formation of shoots [16].

3.4. Effect of Neem leaf concentration

The provision of Neem leaf concentration does not provide a real response to the plant's high vegetative change, trunk diameter, leaf count, number of branches, header width, and generative phase of the change such as fruit count, fruit weight, fruit length, fruit diameter, and weight Crop-agility. It is suspected that the concentration of neem leaves does not play directly in the plant growth process. Neem leaves serve as vegetable insecticides because they contain toxic substances for certain insects. According to [4], The Neem leaf has four natural chemical compounds that are potential as vegetable insecticides with active ingredients i.e., Azadirachtin, Salanin, Meliantriol, and Nimbin is locally systemic.

The intensity of lice pest attack in plants that are given the concentration of the real neem leaf is smaller than the other treatment, and this is because the solution concentration of Mimba leaves can suppress the attack of the lice leaves pest attack Chilli plants. Neem leaves can be used as a vegetable pesticide material because it contains toxic compounds for pests. According to Tukimin and Rizal (2008), The oil of series in the leaves of Mimba can be used as raw material for vegetable pesticide production. Also, Mimba leaves can affect the growth of bug pests, so that the metamorph of the leaf lice will be obstructed. The Mimba leaves contain alkaloid compounds that can stimulate the glands in the lice leaves to produce hormones, with increasing hormones that the head lice will suffer from a metamorphosis failure [12].

Lice are one of the main pests that attack the chili leaves. Tick attacks can lower the rate of photosynthesis of plants, as the leaf lice attack the leaves by piercing and sucking the cell fluid of the leaves. Therefore, the leaves that are attacked can not grow well and will experience cell damage [16]. The use of Neem leaves can reduce the attack of lice leaves that attack chili plants. Mimba contains compounds that can affect the behavior of pests, such as inhibiting appetite and anti-fertility. [17] States that Neem contains nimbidin compounds that can inhibit the appetite of pests so that it will experience death, and the population of insects will decline. Also, the leaves of Mimba contain other compounds that can be used as vegetable pesticides.

3.5. Harvest

The number of chili plants that are given the treatment of various types of banana varieties is not showing real results. Chili Peppers are the main production of chili, and fruit can be utilized directly to be consumed or used as a product. The productivity of chili pepper can be increased by the provision of balanced nutrient elements such as fertilizer N, P, and K. According to Kuyik

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(2010), The addition of nutrients N, P, K in a balanced scale can increase the growth and production of crops.

Banana Bonggol can be used as a source of plant nutrients because it contains essential nutrients that are essential for plants to be able to grow and develop optimally. The nutrients contained in the banana humps include Nitrogen (N), phosphorus (P), potassium (K), iron (FE), and counting calories, carbohydrates, and Rukmana protein (2001). The main macronutrient that plays a role in the formation of fruit is nutrients P. P Nutrient is a macronutrient that is mobile in the generative phase of plants. Element P plays a role in stimulating the growth of roots, as ingredients for protein formation, accelerating flowering, and the supply of seeds and fruits (Arnold and Jeaneke 2015) [10].

The average weight of the chili plants that were given the treatment of various types of banana varieties showed no distinct real results. The weight of the chili pepper plants can be influenced by moisture content contained in chili Peppers; the water content in the fruit is influenced by the level of water absorption in the soil by plants.

Water content treatment of 40%, 60%, and 80% of water conditions are available in plants three times repeated in each treatment. The treatment of water content of the plant affects the real height of the plant, the number of leaves, the total dry weight of the plant, and its productivity. Plants with water content treatment, 80% of water is available to have better results than other treatments. Plants with lower water content will increase the stress of water in plants that cause growth, and the development of these crops will be hampered, thereby affecting the productivity of soybean crops [18]. Water is a significant component in a plant, even reaching 90% of plant cells is composed of water. The water absorbed by the plant also serves as a reaction medium on almost the entire metabolism process. Evapotranspiration is one of the metabolic processes experienced by plants where the water is evaporated through the stomata (transpiration) and the Soil (evaporation) [19].

Water deficiency can affect cell turgor so that it will reduce cell development, protein synthesis, and synthesis of cell walls. Water availability will affect the growth and development of a plant. The initial influence of plants that have been deprived of water is the occurrence of barriers to the opening of stomata leaves, which then have a large effect on the physiological and metabolic processes in the plant [20].

The hump treatment of bananas with different varieties suggests the results are not as distinct in the wet and dry weight of the peppers. The wet weight of plants can be influenced by nutrient supply and organic materials contained in plant organs. Water content also affects the weight of plants. The Volume of water in plants depends on the absorption rate of water by plants. Also, environmental factors such as temperature conditions affect the weight of plants.

High temperatures negatively affect the development of male reproductive organs, including every stage of Microsporogenesis and Mikrogametogenesis. It also has an impact on the deterioration of the polenta viability produced by chili pepper plants cv. Tanjung-2 [5]. The effect of temperature and humidity corresponding to the chili plants in the plant factory room is the temperature of 27 °c which produces the height of the plant, the diameter of the trunk, and the number of leaves higher than at the setpoint temperature 24oC, and 30oC with a high yield of plants 12.92 cm, Trunk diameter 0, 44cm and the number of leaves eight leaves. The temperature is suitable for the growth of leaf area, and the content of chlorophyll in plant factory planting room is temperature 24 ° C with the result of Lau's leaf 7.87 cm2 and chlorophyll content 39.2 units [21].

4. Conclusion

1) The concentration treatment of neem leaves and various humps of banana varieties do not show an influential outcome on plant height rechanges.
2) The hump of the Ambon banana varieties, kepok, and horns gave the same response to growth and production. The treatment of the hump varieties of banana horn on 49 hspt effects on the number of leaves, while the treatment of hump varieties of Banana Horn 35 hspt and Ambon 56 hspt effect on the width of the plant heading.

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3) Giving a variety of different types of banana varieties in the fruit length but does not affect fruit count, fruit weight, fruit diameter, and the weight of chili plants.
4) The intensity of the lice attack is influenced by the concentration of Mimba leaf solution in M3 (45%) and shows smaller results compared with no treatment (control).

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