

THE EFFECT OF CONCENTRATION AND FREQUENCY OF APPLICATION OF BANANA WEEVIL SOLUTION KEPOK ON RED CHILI

Oktavianus Lumban Tobing¹, Yanyan Mulyaningsih¹, Raden Danuningrat¹

¹*Department of Agrotechnology, Djuanda University, Indonesia*

Corresponding Author: oktavianus@unida.ac.id

Abstract: The purpose of the study is to determine the effect of concentration and frequency of application of banana weevil solution kepok against red chili plants is roofed with translucent ultraviolet plastic 70% which acts as a natural growth regulator. Research on the provision of banana weevil solution covered in 70% translucent ultraviolet plastic in open land has not been found before. The growing regulators from the gibberellin and cytokinin groups were able to boost the growth and yield of chili peppers. The method of using a random design of factorial groups, as the first factor is age consists of 9 levels, namely T1: age (14) HSPT, T2: age (14,21) HSPT, T3: age (14,21,28) HSPT, T4: age (14,21,28, 35) HSPT, T5 : age (14,21,28,35, 42) HSPT, T6: age (14,21,28,35,42,49) HSPT, T7: age (14,21,28,35,42,49,56) HSPT, T8: age (14,21,28,35,42,49,56,63) HSPT, and control (T0). The second factor is concentration consists of 3 levels, namely K1 (30%), K2 (45%), and K0 (0%). The results of the study obtained concentration of K1 (30%) with the amount of T6 administration is the best result in vegetative growth of the plant height change, the number of branches, and the width of the header, while the concentration of K1 (30%) give the best results on the length of the fruit, the dry weight of the fruit, and the diameter of the fruit from other treatments. Conclusion of the application of concentration and frequency of the sea of banana weevil kepok containing regulatory substances growing on red chili plants in the field covered with ultraviolet plastic roof significantly increases the growth and yield of red chili peppers.

Keywords: chili response; banana weevil treatment; increase results

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1. INTRODUCTION

The research was conducted in the roof covered with ultraviolet translucent plastic roof 70% in farmer group association (Gapoktan) Repeh Rapih Sukamantri Village Censure Tamansari Bogor. The quality and quantity of chili peppers can be improved through the provision of natural growing regulators (ZPT). Natural ZPT sourced from banana weevil extract can be an alternative and easy to obtain, relatively cheap and safe to use, and more

environmentally friendly. Banana weevil contains microbial decomposing organic matter. The decomposing microbe is located on the outer and inner banana weevil (Suhastyo et al., 2013). Banana weevil contains elements or components of growth hormones in addition to other elements, such as nutrients, vitamins, and others (Nurlaeni & Surya, 2015). In banana weevil, there are gibberellin and cytokinin growth regulators, and there are 7 microorganisms that are very useful for plants namely *Azospirillum*, *Azotobacter*, *Bacillus*, *Aeromonas*, *Aspergillus*, phosphate solvent microbes, and cellulolytic microbes that can be used as solution-making materials (Muharam et al., 2020). Growth Regulators are organic compounds that are not nutrients, and in small amounts encourage, inhibit, or regulate physiological processes in plants. Growth regulators consist of five types of auxin, gibberellin, cytokinin, ethylene, and abscisic acid. Auxin is a compound that can stimulate the lengthening of shoot cells in sub-apical areas. Auxin is usually an acid with an unsaturated core. Auxin is involved in many physiological processes in plants, including cell lengthening, phototropism, geotropism, apical dominance, root initiation, ethylene production, callus formation, fruit development, parthenocarpic, abscission, and genital expression in hermaphrodite plants (Setyati, 2009). Some functions of auxin in plants are for seed germination, root formation, flowering and fertilization, reducing the premature fall of fruit, and breaking dormition shoots/appraisal (Armawi, 2009). Gibberellin serves to stimulate cell division and cell lengthening. The influence of gibberellin on plants is causing plants to produce flowers prematurely, the occurrence of fruit with no pollination, dwarf plants become large quickly in a short time so that the growth of seeds and shoots become fast (Setyati, 2009).

Cytokinin is an adenine replacement compound that improves cell division and growth regulation function. Cytokinin is thought to be produced in roots and transported to shoots, since the substance is found in xylem solutions, but cytokinins are found in large quantities in fruit and seed tissues (Setyati, 2009). The use of natural ZPT made from banana weevil kepok on chili plants is done to stimulate vegetative growth, stimulate the growth of flowers and fruits, and cook the fruit in unison (Suhastyo et al., 2013).

The administration of banana weevil has a significant effect on the header width of the red okra plant with the highest header width for a concentration of 30% (Wea, 2018). Cytokinin hormone content is useful in cell division and adds vegetative growth of plants such as leaves and plant headers (Kurniati et al., 2017). Crop stress due to the use of shade is an agronomic character. The activity of photosynthesis and antioxidants of leaf organs is studied in soy cultivars D16, E93. Shade test of soybean seedlings consisting of 3 levels is (S0): shade-free, (S1): less coverage from sunlight, (S2): medium shade, and (S3): high shade. The results showed a significant decrease in both cultivars with shade conditions (S3): the height of the shade on the specific leaf area changer, the fresh weight of the leaves, and the thickness of the leaves. The decrease occurs in the photochemical change of electron transport and maximum quantum yield (Fv/Fm). Shade-free (S0) causes morphological and physiological plasticity to be more adaptable than (S1), (S2), (S3) to the decrease in biomass weight of seeds (Wen et al., 2020). Testing 6 gibberellin levels consisting of K: 0 ppm (control), G1: 50 ppm gibberellin, G2: 100 ppm gibberellin, G3: 150 ppm gibberellin, G4: 200 ppm gibberellin, and G5: 250 ppm gibberellin. The result of the high increase and the number of leaves of curly red chili plants is significant by the administration of a concentration of 50 ppm gibberellin, there is also an increase in the wet and dry weight of plant seedlings, but the administration of gibberellin will inhibit the wet and dry weight of plant roots (Ulya et al., 2020). The growth and yield of chili peppers are mainly determined by the content of growth regulators contained in banana weevil, in addition, it is determined also by the incidence and severity of anthrax disease caused by *Colletotrichum* sp

mushrooms. The rate of attack depends on local weather conditions, as the study findings stated the concentration of mol solution of banana weevil 45% had a noticeable effect in increasing the height of the plant, the number of leaves, the number of productive branches, and the weight of the fruit per plant compared to the control treatment, but did not differ markedly compared to the concentration of 30%. The results of the study found no anthrax attacks on all plants observed for all treatments (15%, 30%, 45%), meaning a 0% percentage of disease incidence and severity of the disease. It is assumed that environmental factors are not supportive of the development of *Colletotrichum* sp mushrooms (Aziziy et al., 2020).

2. MATERIALS AND METHODS

2.1. Time and Location

The research was conducted on land owned by farmers Gapoktan Repeh Rapih Sukamatri village Ciapus Bogor subdistrict with an ultraviolet plastic roof cover a translucent 70%. Research begins in May to August 2020.

2.2. Tools and Material

The tools used were seker, hairdryer, High-Performance Liquid Chromatography, pH meter, analytical balance, tools glass for analyses, microscope, hygrometer, and thermometer. Materials needed for banana weevil, methanol, and aqua dest.

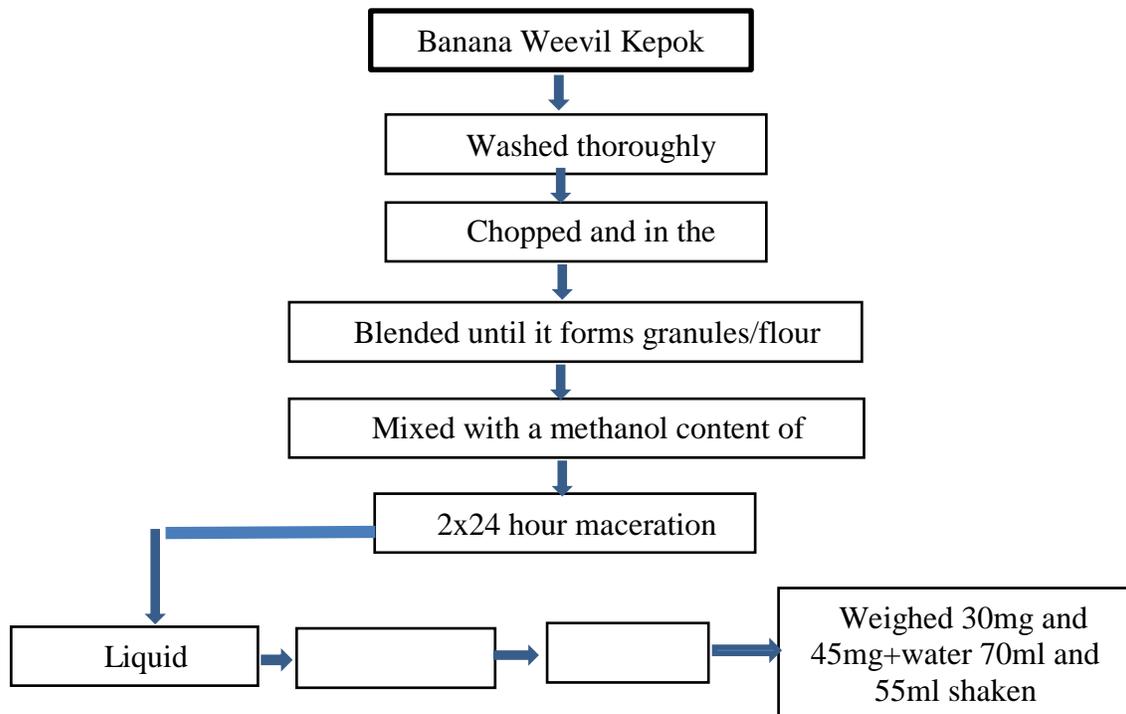


Figure 1 Extraction flow diagram of banana weevil

3. RESULTS AND DISCUSSION

Table 1 shows the effect of administration of concentration and frequency on the average height of plants.

Table 1 Average plant height

Treatment	Average plant height (cm), the day after planting (TDAP)						
	14 TDAP	24 TDAP	34 TDAP	44 TDAP	54 TDAP	64 TDAP	74 TDAP
Concentration							
K0	36,11	40,25	51,61 ^a	63,39 ^a	65,14 ^a	66,95 ^a	75,85 ^a
K1 (30 %)	37,03	45,52	67,52 ^c	77,09 ^b	80,47 ^c	84,24 ^b	85,83 ^b
K2 (45%)	36,85	48,44	64,33 ^b	74,11 ^c	77,92 ^b	82,25 ^b	83,91 ^b
Frequency of administration							
T0	36,11	40,25	51,61 ^a	63,39 ^a	65,14 ^a	66,95 ^a	75,85 ^b
T1 (1 kali)	38,56	45,47	61,58 ^b	70,04 ^b	72,83 ^b	77,74 ^b	80,4 ^b
T2 (2 kali)	38,18	50,11	62,37 ^{bc}	71,49 ^{bc}	74,55 ^{bc}	79,26 ^b	81,27 ^b
T3 (3 kali)	35,88	42,51	63,05 ^{bc}	71,95 ^{bc}	76,76 ^{bc}	80,31 ^b	81,66 ^{bc}
T4 (4 kali)	37,06	48,24	64,73 ^{bcd}	74,2 ^{bcd}	78,25 ^{bcd}	81,68 ^{bc}	83,12 ^{bcd}
T5 (5 kali)	36,15	47,97	66,50 ^{cde}	76,52 ^{cde}	80,19 ^{cd}	85,31 ^{cd}	86,66 ^{cde}
T6 (6 kali)	35,37	47,67	68,37 ^{de}	78,82 ^{de}	82,89 ^{de}	85,99 ^{cd}	87,31 ^{de}
T7 (7 kali)	37	47,84	69,52 ^{de}	79,75 ^{de}	82,15 ^{cde}	87,08 ^d	89,11 ^e
T8 (8 kali)	37,35	46,04	71,28 ^e	82,05 ^e	85,96 ^e	88,61 ^d	89,46 ^e

Description: The numbers followed by the same letter are not real differences in the DMRT Test (5%).

The single factor of treatment of banana weevil solution (K) has a noticeable effect on the height of plants at the observation age of 34-54 HSPT and administration of 30% shows the high yield of plants is best compared to the treatment of K0 (without administration) and K2 (45%), but has no noticeable effect on the observation age of 64-74 HSPT. In a single factor, the treatment of the frequency of administration of banana weevil solution has a noticeable effect on the height of plants at the frequency of administration of T8 but does not differ markedly when compared to other administrations, except for the administration of T0 and the observation age of 14 HSPT and 24 HSPT. Table 2 shows the effect of concentration and frequency on the average header width of chili plants.

The single factor of treatment of banana weevil solution (K) concentration at the age of 34 -74 HSPT differed markedly from the width of the header. Average crop header width K1 (30%) is significantly greater than the K0 treatment, but no different from the K2 treatment (45%) at 34-74 HSPT. In a single factor the frequency of administration of banana weevil 14-34 HSPT is manifestly influential and gives the best width results on the administration of T6 (six times) compared to T0, and, T3 at the header width but not real to the administration of T7 and T8. Table 3 presents the effect of giving concentration and frequency to the average number of branches of chili plants.

Table 2 Average header width

Treatment	Average header width (cm), the day after planting (TDAP)						
	14 TDAP	24 TDAP	34 TDAP	44 TDAP	54 TDAP	64 TDAP	74 TDAP
Concentration							
K0	29,83	38,05	45,11 ^a	56,76 ^a	63,95 ^a	75,9 ^a	80,24 ^a
K1 (30 %)	33,51	41,21	50,5 ^b	69,08 ^b	78,6 ^b	84,6 ^b	87,96 ^b
K2 (45%)	32,71	39,4	48,43 ^b	68,54 ^b	81,1 ^b	84,01 ^b	88,8 ^b
Frequency of administration							
T0	29,83 ^{ab}	38,05	45,11 ^{ab}	56,76 ^a	63,9 ^a	75,9 ^a	80,24 ^a
T1 (1 kali)	32,11 ^{abc}	39,46	42,08 ^{abc}	61,54 ^a	77,3 ^b	83,04 ^b	88,6 ^b
T2 (2 kali)	31,81 ^{abc}	39,53	47,19 ^{abc}	61,03 ^a	80,8 ^b	86,57 ^b	90,08 ^b
T3 (3 kali)	28,5 ^a	37,63	43,83 ^a	69,05 ^b	78,9 ^b	84,1 ^b	87,31 ^{ab}
T4 (4 kali)	33,46 ^{ac}	41,31	49,89 ^{bc}	68,60 ^b	76,6 ^b	80,08 ^b	83,36 ^{ab}
T5 (5 kali)	33,06 ^{abc}	37,92	49,33 ^{abc}	72,55 ^b	76,9 ^b	80,8 ^b	87,28 ^{ab}
T6 (6 kali)	36,06 ^c	43,03	56,11 ^c	72,66 ^b	84 ^b	87,42 ^b	92,86 ^b
T7 (7 kali)	34,83 ^c	40,53	55 ^c	73,85 ^b	81,4 ^b	85,59 ^b	88 ^b
T8 (8 kali)	35,06 ^c	43,04	52,28 ^c	71,21 ^b	82,8 ^b	86,84 ^b	89,56 ^b

Description: The numbers followed by the same letter are not real differences in the DMRT Test (5%).

Table 3 Average number of productive branches

Perlakuan	Average productive branch (branch), the day after planting (TDAP)						
	14 TDAP	24 TDAP	34 TDAP	44 TDAP	54 TDAP	64 TDAP	74 TDAP
Concentration							
K0	8,11 ^a	31,33 ^a	38,67 ^a	63,44 ^a	74,55 ^a	80,06 ^a	81,95 ^a
K1 (30 %)	23,08 ^b	45,6 ^b	63,15 ^b	76,89 ^b	96,21 ^b	104,18 ^b	105,03 ^b
K2 (45%)	25,79 ^b	43,31 ^b	73,66 ^c	80,78 ^c	104,49 ^c	111,39 ^b	112,81 ^b
Frequency of administration							
T0	8,11 ^a	31,33 ^a	38,67 ^a	63,44 ^a	74,55 ^a	80,06 ^a	81,95 ^a
T1 (1 kali)	22,11 ^b	41,17 ^b	62,03 ^b	76,89 ^b	94,89 ^b	100,89 ^b	101,22 ^b
T2 (2 kali)	22,28 ^b	43,61 ^{bc}	63,89 ^b	80,78 ^b	100,33 ^b	107 ^b	107,92 ^b
T3 (3 kali)	20,28 ^b	49,22 ^{bc}	66,28 ^b	81 ^b	96,83 ^b	103,89 ^b	105,46 ^b
T4 (4 kali)	25,28 ^b	52,61 ^c	71,11 ^b	75,94 ^b	90,72 ^b	103,22 ^b	103,97 ^b
T5 (5 kali)	27 ^b	45,72 ^{bc}	70,33 ^b	84,39 ^b	103,72 ^b	110,33 ^b	112,36 ^b
T6 (6 kali)	29,11 ^b	41,11 ^{ab}	75,22 ^b	83,28 ^b	108,56 ^b	116,61 ^b	118,74 ^b
T7 (7 kali)	24,22 ^b	38,61 ^{ab}	69,72 ^b	81,78 ^b	95,17 ^b	101,67 ^b	102,75 ^b
T8 (8 kali)	25,22 ^b	43,56 ^{bc}	68,67 ^b	80,78 ^b	112,56 ^b	118,67 ^b	118,96 ^b

Description: The numbers followed by the same letter are not real differences in the DMRT Test (5%).

K2 (45%) differ markedly at 34-54 HSPT against K1 concentrations but do not differ markedly at other observational ages except at K0. In a single factor, the treatment of banana weevil solution had a noticeable effect on the number of productive branches at the age of 24 HSPT in the T0 treatment but did not affect other treatments. Administration of banana weevil with a frequency of T5 (five times) shows that the average real productive branch is greater than the administration of control (K0) but does not differ significantly from the frequency of other administration at 14, 34, 44, 54, 64, 74 HSPT differs only markedly from the administration of T0 (control). Table 4 shows the effect of concentration and frequency on the average length of chili peppers.

Table 4 Average length of fruit

Treatment	Fruit Length (cm)				
	Harvest 1	Harvest 2	Harvest 3	Harvest 4	Average
Concentration					
K0	11,27 ^a	12,01	11,19	11,56 ^a	11,19 ^a
K1 (30 %)	12,21 ^b	12,13	11,77	11,56 ^b	11,92 ^c
K2 (45 %)	12,08 ^b	11,93	11,34	10,92 ^b	11,57 ^b
Frequency of administration					
T0	11,27 ^a	12,01 ^{ab}	11,19	11,56	11,19 ^a
T1 (1 kali)	12,37 ^b	11,43 ^a	11,47	10,48	11,44 ^a
T2 (2 kali)	11,86 ^{ab}	11,87 ^{ab}	11,22	10,54	11,37 ^a
T3 (3 kali)	12,2 ^b	11,53 ^b	11,5	11,94	11,79 ^a
T4 (4 kali)	12,17 ^{ab}	12,36 ^b	11,91	11,05	11,87 ^a
T5 (5 kali)	11,52 ^{ab}	11,92 ^{ab}	10,92	11,8	11,54 ^a
T6 (6 kali)	12,01 ^{ab}	12,34 ^b	12,05	11,18	11,90 ^a
T7 (7 kali)	12,59 ^b	12,48 ^b	11,48	11,6	12,04 ^a
T8 (8 kali)	12,42 ^b	12,32 ^b	11,88	11,3	11,98 ^a

Description: The numbers followed by the same letter are not real differences in the DMRT Test (5%).

The single factor of treatment of banana weevil solution (K) differs markedly from the length of the fruit at harvest one and fourth at the concentration of K1 (30%) K0 but no real difference from the treatment of K2 (45%), the average plant given a concentration of K1 (30%) best results compared to K0 and K2 in the 1st and 2nd harvests. In a single factor, the treatment of the frequency of administration of banana weevil solution T7 has a noticeable effect on the length of the fruit in the harvest to one with the treatment of T0 while in the other frequency of administration has no noticeable effect. In the second harvest, the frequency of T7 (7 times) is significantly influential with the administration of T1 but does not differ markedly from the other frequency giving. Table 5 shows the effect of concentration and frequency on the average dry weight of chili peppers.

Tabel 5 Average dry weight of fruit

Perlakuan	Dried Fruit Weight (g)				
	Harvest 1	Harvest 2	Harvest 3	Harvest 4	Average
Concentration					
K0	17,07	17,84	16,55	20,57	18,01
K1 (30 %)	16,94	22,13	20,02	18,08	19,29
K2 (45 %)	15,83	19,27	18,55	19,55	18,30
Frequency of administration					
T0	17,07	17,84	16,55	20,57	18,01
T1 (1 kali)	13,27	14,27	20,56	16,51	16,15
T2 (2 kali)	17	21,94	19,77	20,74	19,86
T3 (3 kali)	15,27	22,77	16,53	18,87	18,36
T4 (4 kali)	16,75	22,07	20,41	15,08	18,58
T5 (5 kali)	16,86	20,36	19,27	18,96	18,86
T6 (6 kali)	19,65	21,07	20,38	16,76	19,46
T7 (7 kali)	16,23	21,01	20,12	21,39	19,69
T8 (8 kali)	16,05	22,11	17,27	22,23	19,41

The treatment of the concentration of the solution and the amount of administration of banana weevil solution or every single factor does not have a noticeable influence on the dry weight of red chili fruit in all harvest periods. Heavy loss due to the process of opening is 25-50% (Pangidoan & Purwanto, 2014).

Table 6 shows the effect of concentration and frequency on the average diameter of chili fruit.

Table 6 Average diameter of fruit

Treatment	Fruit diameter (cm)				
	Harvest 1	Harvest 2	Harvest 3	Harvest 4	Average
Concentration					
K0	11,28 ^a	8,07 ^a	10,52	12,48	11,42 ^a
K1 (30 %)	12,34 ^b	12,73 ^b	11,31	11,84	12,05 ^b
K2 (45 %)	12,34 ^b	12,6 ^b	11,58	11,83	12,09 ^b
Frequency of administration					
T0	11,28 ^a	8,07 ^a	10,52	12,48	11,42 ^a
T1 (1 kali)	12,3 ^b	12,96 ^b	11,9	11,51	12,17 ^b
T2 (2 kali)	12,07 ^b	12,22 ^b	11,2	11,37	11,72 ^{ab}
T3 (3 kali)	12,51 ^b	12,59 ^b	11,82	12,13	12,27 ^b
T4 (4 kali)	11,85 ^b	12,47 ^b	11,9	11,92	12,03 ^b
T5 (5 kali)	12,32 ^b	12,88 ^b	11,09	11,76	12,01 ^b
T6 (6 kali)	12,63 ^b	12,84 ^b	11,52	11,83	12,21 ^b
T7 (7 kali)	12,75 ^b	12,57 ^b	11,3	11,96	12,15 ^b
T8 (8 kali)	12,25 ^b	12,77 ^b	10,78	12,23	12,01 ^b

Description: The numbers followed by the same letter are not real differences in the DMRT Test (5%).

K1(30%) with K0 is different real, but not really different from the treatment of K2. In the administration of the frequency of administration, T7 has a noticeable effect on the administration of T0 while in other frequencies of administration has no noticeable effect. In a single factor of banana weevil solution concentration, the treatment that gives the highest average fruit diameter is K2 treatment (45%) and significantly different from the control treatment but not significantly different from the K1 treatment (30%).

4. CONCLUSION

The concentration and frequency of banana weevil solution kepok can boost the growth and yield of red chili plants planted in the ground covered in translucent ultraviolet plastic 70%. This research prospect can be carried out on farmland that is shaded by 70% of incoming light.

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