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Response of Growth and Yield of Stevia (*Stevia rebaudiana*) to Giving Old Coconut Water and Different Types of Irrigation

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ABSTRACT

The purpose of this study was to determine the response and yield of the stevia plant to different concentrations of old coconut water combined with two different types of irrigation, namely drip irrigation and sprinkler irrigation. The experimental design was a split plot with the RAK basic design pattern and two factors. The first factor is the use of different irrigation types, including drip and sprinkler irrigation. The second factor is the concentration of coconut water, which consists of 5 levels, namely A0 = 0% coconut water concentration, A1 = 25% coconut water concentration, A2 = 50% coconut water concentration, A3 = 75% coconut water concentration, and A4 = water concentration coconut 100%. Data analysis used the T-test to determine the effect of the type of irrigation and ANOVA to determine the impact of giving old coconut water with the F test at level α = 0.05. DMRT test was done to measure the significant values of the ANOVA test. The results showed no interaction between different irrigation types and coconut water concentration for all observational variables. Different kinds of irrigation showed significant differences in some parameters. Giving old coconut water gives different results in each experiment.

INTRODUCTION

Sugar is a commodity with a relatively high level of consumption in Indonesia, namely 5.1 million tonnes in 2017, 2018, and 2019, and 5.2 million tonnes in 2020 (BPS, 2020). High levels of cane sugar consumption in humans can potentially cause diabetes and even death. This is in line with what was conveyed by Idealistiana et al. (2021) that sugar consumption patterns that are excessive or above the recommended amount of consumption can cause death.

The stevia plant (*Stevia rebaudiana Bert*) is one of the plants used as a natural sweetener to replace sugar (Prasetya et al., 2014). According to Wahyono et al. (2021), the stevia plant has a high level of sweetness, namely 200-300 times higher than cane sugar, so it is often used as a natural sweetener to replace cane sugar. Stevia leaves are usually used as a mixture in

making food and drinks. The stevia plant is a solution for consumers who cannot consume sugar, for example those who have diabetes.

Coconut water is a rehydration fluid that is rich in minerals such as potassium, calcium, magnesium and manganese (Borut et al., 2021). Coconut water also contains the hormone auxin, which accelerates plant growth. According to Sumanto and Purba (2019), giving coconut water can stimulate growth by encouraging cell division in stevia plants.

The macronutrients and micronutrients contained in old coconut water are quite complete, so they can have a positive effect on plant growth (Edo and Murdaningsih, 2018). The positive influence of the high elemental content of coconut water can help increase plant productivity. The stevia plant is used for its leaves, so providing coconut water as additional nutrition for the stevia plant is expected to improve the quality of the stevia leaves.

Irrigation is one of the important factors that supports stevia cultivation activities. There are many irrigation techniques that can be applied, one of which is drip irrigation and bulk irrigation. Drip irrigation technique is an irrigation technique that aims to maintain soil moisture and prevent excessive water loss. The use of drip irrigation techniques is expected to meet the water needs of plants. The sprinkler irrigation technique is an irrigation technique that, in its application, can save water and time in the process of watering plants (Putra et al., 2017). The bulk irrigation technique is an irrigation technique that is carried out by distributing water from a water pump and then spraying it into the water, and the water will fall to the ground so that plant roots can absorb it. This research aimed to determine the effect of giving old coconut water and using different types of irrigation on the growth and yield of stevia plants.

METHODS

Location and Time

The research "Response of Growth and Yield of Stevia Plants (Stevia rebaudiana Bertoni) to the Application of Coconut Water and Different Types of Irrigation" was carried out in December 2021 - February 2022, Karangploso, Malang Regency, East Java Province . Karangploso Gardens is at an altitude of ±750 meters above sea level.

Materials and Tools

Stevia seeds, rock phosphate, EM4, phosphoric acid, urea, white KCl, water, old coconut water, and labels. Hoe, measuring cup, bucket, sprayer, alvaboard, pick, meter, bottle, ruler, digital scale, PVC pipe, ball valve, knee, streamline, tapelock valve + CD grommet set, rubber seal flare, joint flare, end line tape, joint tape, tee, gyro-net, and shock pipe

Experimental design

This research uses a split-plot design with the basic RAK (Randomized Group Design) design pattern and uses two research factors. The main plot in this research is the use of different types of irrigation, namely drip irrigation (I1) and bulk irrigation (I2). The subplots in this study are

coconut water concentration, which consists of 5 levels, namely A0 = without coconut water, A1 = 25% coconut water concentration, A2 = 50% coconut water concentration, A3 = 75% coconut water concentration, and A4 = concentration 100% coconut water. The total treatment was 10 with 3 repetitions, with 30 experimental units.

Research procedures are as follows:

Preparation of Stevia Seeds. The aim of this activity is to obtain uniform seeds so that they can be used for research material. The characteristics of the seeds to be used are: 1) The seeds are in the vegetative phase; 2) Minimum plant height of 15 cm; 3) Has an upright stem; and 4) Free from pests and diseases.

Land Management. The land that will be used is land owned by PT. Daya Santosa Engineering, Karangploso, Malang . Land processing begins with breaking up the soil using a magic tractor, loosening the soil using a power harrow, spreading filter cake, rock phosphate, and EM4. The land was then made into beds and irrigation channels installed. The size of the bed used is 80 cm – 100 cm with a bed height of 10 cm – 20 cm and a trench width of 40 cm – 50 cm.

Irrigation Preparation. Irrigation preparation is carried out by installing irrigation installations on the research land according to the beds that will be used. The irrigation used in this research is drip irrigation and bulk irrigation.

Preparation of Coconut Water . The experimental designs that will be used are 0%, 25%, 50%, 75%, and 100%. At a concentration of 0%, 100 ml of water was used without adding old coconut water. At a concentration of 25%, mix 25 ml of old coconut water with 75 ml of water. At a concentration of 50%, mix 50 ml of old coconut water with 50 ml of water. At a concentration of 75%, mix 75 ml of old coconut water with 25 ml of water. At a concentration of 100%, 100 ml of old coconut water without adding water was used.

Transplanting Stevia. Transplanting is done by making a planting hole with a depth of 10 cm with a planting distance of 25 cm x 30 cm, where 25 cm is the distance between plants in a column, while 30 cm is the distance between plants in a row.

Harvest. Harvesting of stevia plants is carried out when the plants show flowers between 5-10% of the population or when the plants are 40-60 days old after pruning. Harvesting is carried out on all parts of the plant and then observed according to the observation variables.

Data analysis. The data analysis used in this research is the T test to see the effect of different types of irrigation and analysis of variance (ANOVA) to see the effect of giving old coconut water with the F test at the $\alpha = 0.05$ level. If the F-Calculation is greater than the F-Table then

this indicates that there is a significant difference effect which is then carried out by a further DMRT test with a confidence level of p = 0.05.

RESULTS AND DISCUSSIONS

Providing old coconut water and different types of irrigation have an influence on the growth and yield of stevia plants (*Stevia rebaudiana B.*). Below is presented table 1 which is a summary of the results of data analysis on all observation variables and table 2 which is the result of laboratory analysis of sucrose and total chlorophyll for each experimental plot.

Table 1 Summary of Data Analysis Results for All Observation Variables

No.	Observation Variables	Irrigation Type	Old Coconut Water	I x A
1.	Plant height	**	ns	ns
2.	Number of Leaves	**	ns	ns
3.	Root Length	*	ns	ns
4.	Plant Wet Weight	ns	ns	ns
5.	Wet Weight of Harvest Results	**	ns	ns
6.	Dry Weight of Harvest Results	**	ns	ns

Explanation: **= very significantly different *= significantly different n=not significantly different

Table 2. Results of Laboratory Analysis of Sucrose and Total Chlorophyll

Treatment	Sucrose	Total Chlorophyll
I1A0	24.3	22.69
I1A1	7.88	29.37
I1A2	4.85	27.29
I1A3	22.94	28.84
I1A4	8.35	79.84
I2A0	3.86	16.12
I2A1	7.46	24.44
I2A2	1.48	19.02
I2A3	9.05	33.02
I2A4	7.67	17.64

Based on table 1, the interaction between the type of irrigation and the provision of old coconut water has a non-significant different effect on all observed variables. The type of irrigation provides very significant different results on plant height, number of leaves, wet weight of the harvest, and dry weight of the harvest. The type of irrigation gave significantly

different results on root length, but was not significantly different on plant fresh weight. Giving old coconut water gave non-significantly different results for all observed variables.

Based on table 2, it is known that the use of different irrigation and the provision of old coconut water gave different results on the sucrose content and total chlorophyll of stevia plant leaves. The results of this analysis are the results of laboratory analysis of leaf samples in each experimental plot.

Plant height

The interaction between different types of irrigation and giving old coconut water gave insignificantly different results on plant height. Insignificantly different results also occurred for the single factor of giving old coconut water on plant height. The existence of an insignificant different effect on the provision of mature coconut water could be caused by the research environmental conditions. This environmental condition is high rainfall which can affect the absorption of nutrients by plants. According to Karim et al (2019), high rainfall can cause nutrients to be carried away by rainwater so that old coconut water that has not been fully absorbed by plants will be lost in rainwater.

The following is a graph of the results of the analysis of various types of irrigation treatment on plant height which gave very significantly different results.

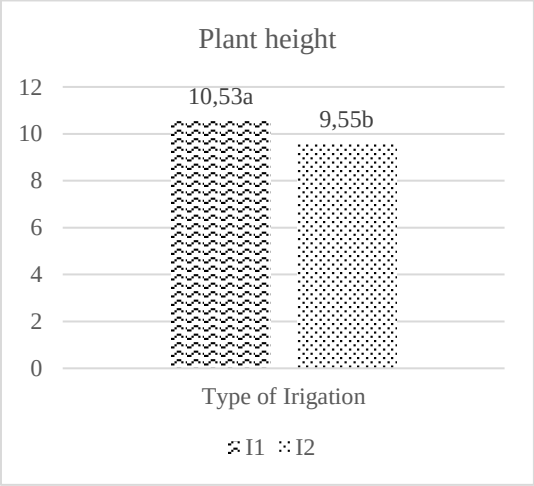


Figure 1 Diagram of Irrigation Type Treatment for Plant Height

The use of different types of irrigation gives very significantly different results on the variable height of stevia plants. This is in accordance with research conducted by Adhiguna and Rejo (2018), that the use of drip irrigation has an efficiency level of 80-95% compared to the use of bulk irrigation. This is because the provision of water using drip irrigation techniques is carried out by providing water continuously in small volumes. Providing water by drip irrigation is able to maintain soil moisture and avoid high volume water loss so that plant water needs will always be met.

Number of Leaves

The interaction between the use of different types of irrigation and the provision of old coconut water gave non-significantly different results on the number of stevia plant leaves. The single factor of giving old coconut water also gave insignificantly different results to the number of stevia plant leaves. Based on research conducted by Purba (2017), coconut water contains phosphorus, potassium, minerals, vitamins, and 3 growth hormones such as auxin, gibberellin, and cytokinin which can support cell division. According to Riski and Ramli (2022), the nutritional content in old coconut water can provide a good response to plant growth such as the number of leaves if the elements provided are sufficient for the plant's needs. Old coconut water is able to provide a good response to plant growth, but the concentration used has not provided significantly different results on plant growth.

The following is a graph of the results of the analysis of various types of irrigation treatment on the number of leaves which gave very significantly different results.

Figure 2 Diagram of Treatment Type of Irrigation on Number of Leaves

The single factor of using different types of irrigation gives very significantly different results on the number of leaves. This is related to the plant height variable, where increasing plant height will affect the number of leaves. According to Rezky (2018), sufficient water availability will help plants to regenerate new cells resulting in an increase in plant height which is also followed by an increase in the number of leaves. The principle of using drip irrigation is to provide small amounts of water in a sustainable manner so that it can meet the plant's water needs.

Root Length

The interaction between different types of irrigation and provision of old coconut water gave non-significantly different results on the root length variable. The single factor of giving old coconut water also gave non-significantly different results on the root length variable. According to Setyawati et al. (2020), root length is closely related to water and nutrient

absorption. The type of soil used in this research has a clay texture, which has a good ability to store water and nutrients. High rainfall causes the soil to hold a lot of water so that the old coconut water cannot be absorbed optimally by the plants. This is in accordance with what was stated by Haryati (2014) that providing water above the soil's water holding capacity will cause the water to move as surface flow or can even move to deeper soil layers.

The following is a graph of the results of the analysis of various types of irrigation treatment on root length which gave very significantly different results.

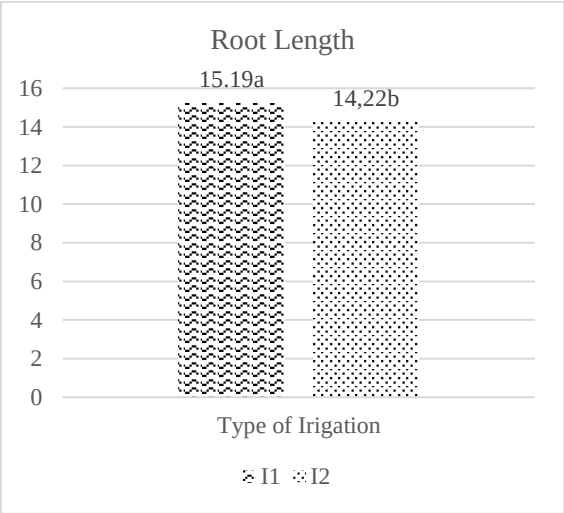


Figure 3 Diagram of Treatment Type of Irrigation on Root Length

The use of different types of irrigation gives significantly different results on root length. According to Witman (2021), the use of drip irrigation can slow down the process of water evaporation. This is because the water distributed through it will be dripped in small volumes continuously so that the soil will continue to be moist. According to Mustawa et al. (2017), soil with a clay texture is the most efficient type of soil for the use of drip irrigation because it has a higher total pore space than sandy clay and clay soils. Using bulk irrigation can cause plants to lose water more quickly. This is in accordance with what was stated by Negara et al. (2015) that the use of bulk irrigation can cause water loss caused by evaporation on the soil surface.

Plant Wet Weight

The interaction between the use of different types of irrigation and the provision of old coconut water gave non-significantly different results on the fresh weight of the plants. The single factor of using the type of irrigation and the single factor of providing coconut water also gave non-significantly different results on the variable wet weight of the plant. Nutrient absorption by plants can be influenced by various factors, one of which is soil texture. The soil texture used in the research is clay soil texture. Clay soil texture generally has a liquid limit value. The liquid limit is the liquid and plastic state limit which describes the minimum water content (Lestari, 2014). The treatment used is the use of irrigation and the provision of old coconut water, both

of which have liquid properties. The clay soil texture on the research land, if it receives water beyond its limit, will cause the water to flow to the side of the soil so that it cannot be optimally absorbed by plants and causes the results to be insignificantly different.

Wet Weight of Harvest Results

The interaction between the use of different types of irrigation and the provision of old coconut water gave non-significantly different results on the fresh weight of the harvest. Insignificantly different results also occurred for the single factor of giving old coconut water. Another factor that can influence plant growth is climate. This is in accordance with what was stated by Heksaputra et al. (2013), that climatic conditions can influence plant growth and thus also influence plant productivity. Karangploso Gardens has rainfall in 2021, namely 2454 mm/year. High rainfall can affect the absorption of nutrients by plants. This can happen because soil conditions that are too moist cause a decrease in oxygen in the soil so that nutrient absorption is disrupted (Firmansyah, 2017). In this case, the absorption of nutrients from old coconut water is disrupted, giving results that are not significantly different to the wet weight of the harvest.
The following is a graph of the results of the analysis of various types of irrigation treatment on the wet weight of the harvest which gives very significantly different results.

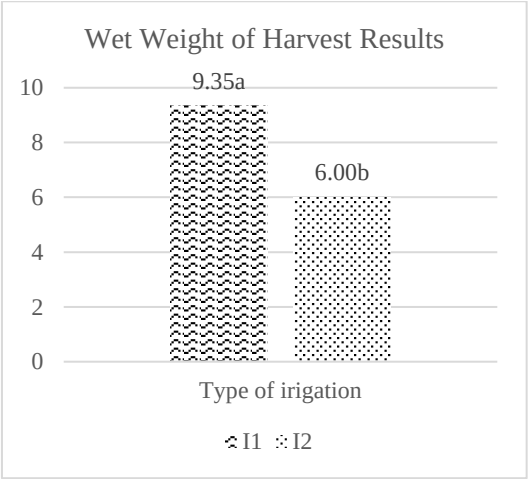


Figure 4 Diagram of Irrigation Type Treatment for Wet Weight of Harvest Results

The use of different types of irrigation can provide very significant different results on the wet weight of the harvest. The use of drip irrigation on stevia plant biomass provides better results than the use of bulk irrigation. According to Krestiani et al. (2022), the use of drip irrigation can increase the efficiency of irrigation water use by up to 90%. The working principle of using drip irrigation is to flow water continuously through droplets in the area around the plant roots so as to increase the efficiency of water use. Providing water via drip continuously allows plants to absorb water optimally so that it can provide significantly different results on the biomass of stevia plants. According to Rahmawati et al (2015), the use of bulk irrigation uses a principle like rain, where water is given to plants by spraying water into the air and dropping it around the plants. The use of bulk irrigation was less effective in

this study because irrigation water was given to the entire land. This causes a lack of irrigation efficiency because it is not focused on the plants being cultivated.

Dry Weight of Harvest Results

The interaction between the use of different types of irrigation and the provision of old coconut water gave non-significantly different results on the dry weight of the harvest. The single factor of giving coconut water also gave insignificantly different results to the dry weight of the harvest. According to Riski and Ramli (2022), old coconut water contains various nutrients, both macro and micro, which can support plant growth. Unsuitable environmental conditions can affect the absorption of nutrients from old coconut water. This is in accordance with what was stated by Krisna et al. (2017), that environmental conditions that are less suitable for plant growth can affect plant nutrient absorption. In this case, the environmental conditions in the Karangploso garden are not suitable for growing stevia plants so that the absorption of nutrients from old coconut water is disrupted.

The following is a graph of the results of the analysis of various types of irrigation treatment on the dry weight of the harvest which gives very significantly different results.

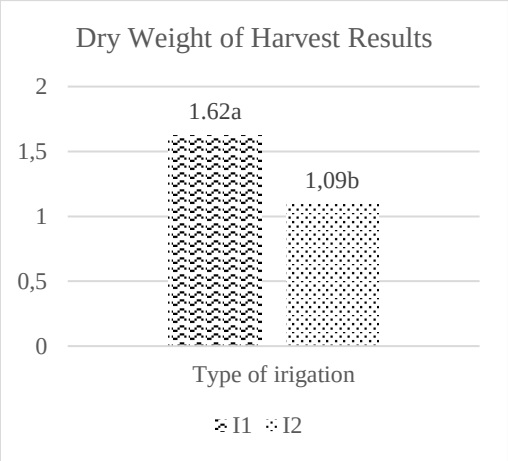


Figure 5 Diagram of Irrigation Type Treatment of Dry Weight of Harvest Results

The single factor of providing different types of irrigation gives very significantly different results on the dry weight of the harvest. According to Hidayat (2008), the very different analysis results regarding the dry weight of the harvest could be caused by an increase in the rate of plant photosynthesis. The rate of photosynthesis can be influenced by environmental factors, one of which is soil conditions (Setyanti et al., 2013). The soil condition in question is the nutrient content in the soil. The use of drip irrigation is able to maintain soil moisture so as to maximize nutrient absorption by plants.

Sucrose Analysis

The use of different irrigation and the provision of coconut water gave different results on the sucrose levels in the leaves of stevia plants. Based on the results of laboratory analysis in table 4.2, it is known that the combination of drip irrigation and without giving old coconut water produces the highest sucrose levels . The combination of drip irrigation and a mature coconut water concentration of 75% produced the second highest sucrose content . The combination of bulk irrigation and 75% coconut water concentration produced the third highest sucrose content. The following is a graph of the results of sucrose analysis on stevia plant leaves.

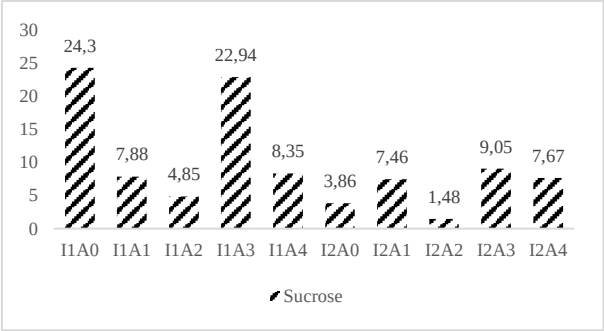


Figure 6 Graph of Sucrose Analysis in Stevia Plant Leaves

Sucrose levels in stevia plant leaves can be influenced by environmental conditions in the study area. Based on research conducted by Pal et al (2015), high stevioside content is found in stevia leaves with moderate N levels. This can happen because the N content is sufficient for plants to increase the rate of photosynthesis so that the stevioside content in the leaves can increase. The sucrose content in the leaves of the stevia plant with drip irrigation provides a fairly high sucrose content with a concentration of 75% in old coconut water. Suitable environmental conditions and supported by adequate nutrition are able to support plant growth. This is in accordance with what was stated by Rianditya and Hartatik (2022), that plant nutrition is very important for metabolic processes. Photosynthesis activity is one of the plant metabolisms that produces photosynthesis in the form of sucrose so that photosynthesis activity has a direct effect on the sucrose content of stevia plant leaves.

Total Chlorophyll Analysis

Using different types of irrigation and giving old coconut water gave different results on the total chlorophyll of stevia plant leaves in each treatment combination. Based on figure 4.6, the combination of drip irrigation and 100% concentration of mature coconut water gives the highest results on the total chlorophyll of stevia leaves. The combination of bulk irrigation and mature coconut water concentration of 75% gave the second highest total chlorophyll yield. The combination of drip irrigation and 25% mature coconut water concentration gave the third highest total chlorophyll yield. The following is a graph of the results of sucrose analysis on stevia plant leaves.

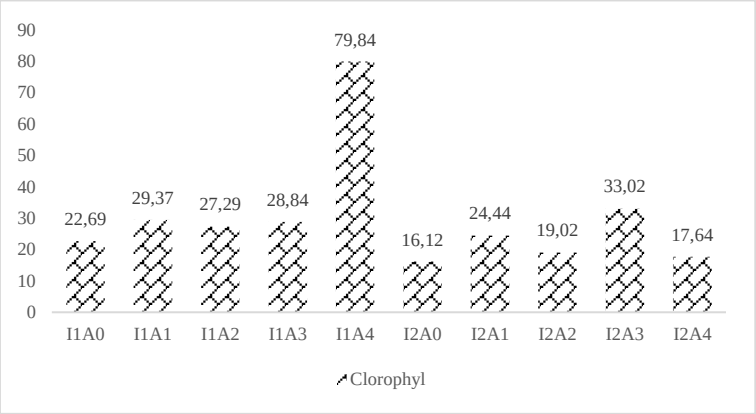
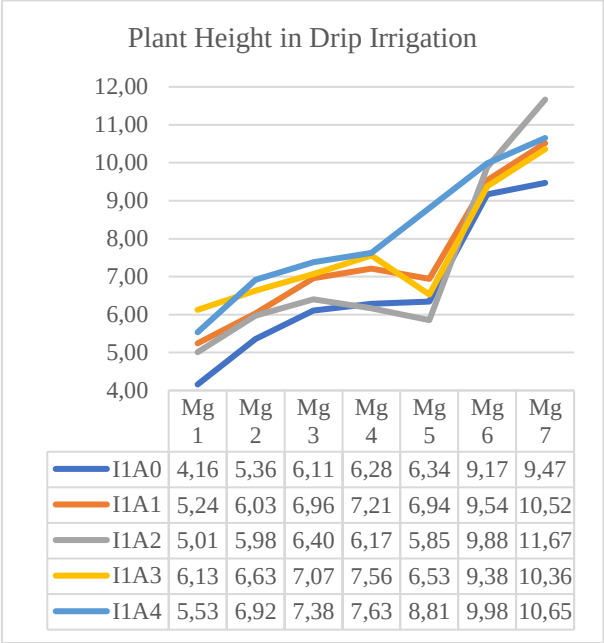


Figure 7 Graph of Total Chlorophyll Analysis in Stevia Plant Leaves

Leaf chlorophyll levels can be influenced by several factors, such as shade and growing season (Kosma et al, 2013). The presence of shade means that plants receive limited light intensity. This hampers the rate of plant photosynthesis, resulting in a decrease in leaf chlorophyll levels . The choice of planting season also influences total leaf chlorophyll. Based on research conducted by Kosma et al (2013), winter has low light intensity so that the photosynthesis rate is low and produces low chlorophyll levels . According to Fallovo et al (2009), chlorophyll levels are not only influenced by the season, but are also influenced by nutrients, especially the elements Ca and N. According to Rosniawaty et al (2020), coconut water contains the elements N and Mg which can help increase levels leaf chlorophyll. The use of drip irrigation and the provision of coconut water with a concentration of 100% provides the highest total chlorophyll yield because the use of drip irrigation is able to create moist environmental conditions so that water absorption of plant nutrients can be maximized. Giving 100% old coconut water contains more nutrients than the concentration below so it can produce the highest chlorophyll levels in the leaves of the stevia plant.

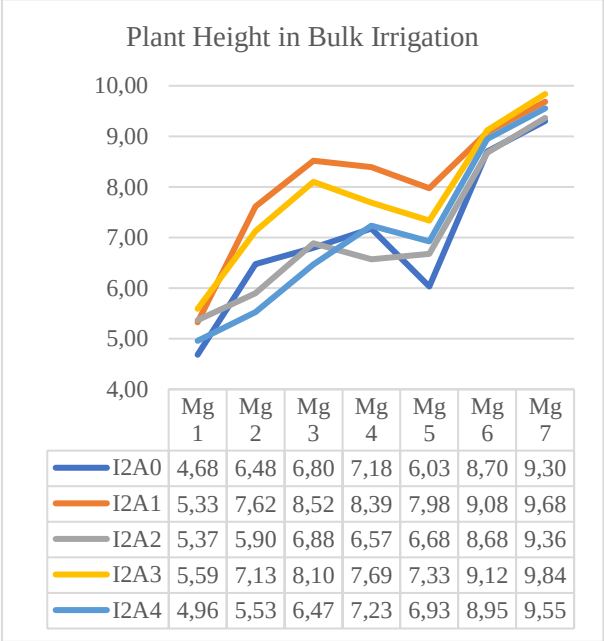
Height Growth of Stevia Plants Against Drip Irrigation and Bulk Irrigation

Giving old coconut water gives different results on the growth of stevia plants. Concentrating old coconut water on plant height in bulk irrigation gives quite good results. This can be seen from the graph of plant height growth which continues to increase from the first week to the seventh week. The following is a graph of the height growth of stevia plants under drip irrigation and bulk irrigation.



	Mg 1	Mg 2	Mg 3	Mg 4	Mg 5	Mg 6	Mg 7
I1A0	4,16	5,36	6,11	6,28	6,34	9,17	9,47
I1A1	5,24	6,03	6,96	7,21	6,94	9,54	10,52
I1A2	5,01	5,98	6,40	6,17	5,85	9,88	11,67
I1A3	6,13	6,63	7,07	7,56	6,53	9,38	10,36
I1A4	5,53	6,92	7,38	7,63	8,81	9,98	10,65

Figure 8 Graph of Stevia Plant Height Growth Against Drip Irrigation



	Mg 1	Mg 2	Mg 3	Mg 4	Mg 5	Mg 6	Mg 7
I2A0	4,68	6,48	6,80	7,18	6,03	8,70	9,30
I2A1	5,33	7,62	8,52	8,39	7,98	9,08	9,68
I2A2	5,37	5,90	6,88	6,57	6,68	8,68	9,36
I2A3	5,59	7,13	8,10	7,69	7,33	9,12	9,84
I2A4	4,96	5,53	6,47	7,23	6,93	8,95	9,55

Figure 9 Graph of Stevia Plant Height Growth Against Bulk Irrigation

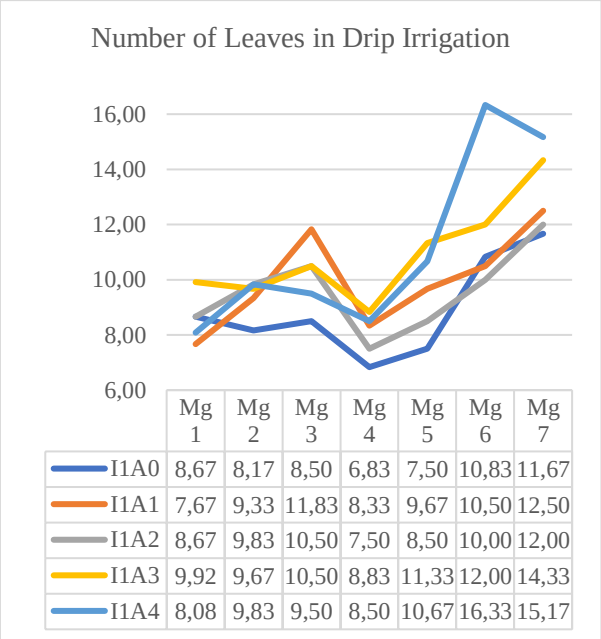
Providing the best concentration of old coconut water for plant height growth in drip irrigation was seen at a concentration of 50%. Providing the best concentration of old coconut water for plant height growth in bulk irrigation was seen at a concentration of 75%. This could be because this concentration is sufficient to support the height growth of stevia plants. This is in accordance with what was stated by Lutfia et al. (2017), that a concentration of mature coconut water at the 50% level is able to provide the maximum amount of cytokinins, so that it

is able to support cell division. Cytokinins have the function of increasing cell division so that they can increase plant height growth. Apart from the cytokinin hormone, old coconut water also contains the hormones auxin and gibberellin which can increase the growth of stevia plants. The auxin hormone helps stimulate root growth, thereby increasing the absorption of water and nutrients (Admaja et al., 2015). The gibberellin hormone helps plants grow normally (Admaja et al., 2015).

The hormones auxin, cytokinin and gibberellin are really needed by stevia plants to support plant height growth. The concentration of old coconut water is between 50-75%, containing sufficient hormones and nutrients to support the growth of stevia plants. According to Sembiring and Mawarni (2017), providing an optimal concentration of old coconut water can increase plant growth, but if it exceeds the optimal concentration it will disrupt the plant's metabolic processes.

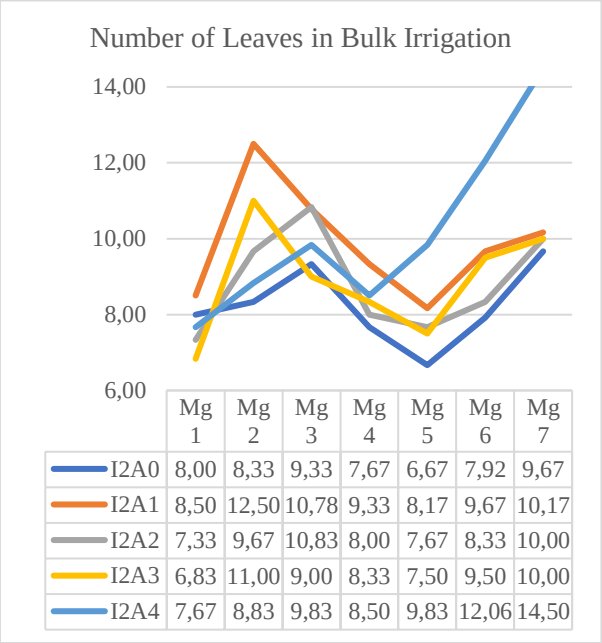
Growth in the Number of Stevia Leaves in Drip Irrigation and Bulk Irrigation

The following is a graph of the growth of the number of stevia leaves in drip irrigation and bulk irrigation.



	Mg 1	Mg 2	Mg 3	Mg 4	Mg 5	Mg 6	Mg 7
I1A0	8,67	8,17	8,50	6,83	7,50	10,83	11,67
I1A1	7,67	9,33	11,83	8,33	9,67	10,50	12,50
I1A2	8,67	9,83	10,50	7,50	8,50	10,00	12,00
I1A3	9,92	9,67	10,50	8,83	11,33	12,00	14,33
I1A4	8,08	9,83	9,50	8,50	10,67	16,33	15,17

Figure 10 Graph of Growth in the Number of Stevia Leaves Against Drip Irrigation



	Mg 1	Mg 2	Mg 3	Mg 4	Mg 5	Mg 6	Mg 7
I2A0	8,00	8,33	9,33	7,67	6,67	7,92	9,67
I2A1	8,50	12,50	10,78	9,33	8,17	9,67	10,17
I2A2	7,33	9,67	10,83	8,00	7,67	8,33	10,00
I2A3	6,83	11,00	9,00	8,33	7,50	9,50	10,00
I2A4	7,67	8,83	9,83	8,50	9,83	12,06	14,50

Figure 11 Graph of Growth in the Number of Stevia Leaves Against Bulk Irrigation

Providing 100% coconut water concentration gave the best results for the growth of the number of stevia plant leaves, both in drip irrigation and bulk irrigation. This can be seen in the increasing number of stevia plant leaves from the first week to the seventh week. This happens because the more coconut water given to plants, the more macro and micro nutrients the plants receive. Old coconut water contains the elements N, P, K, Mg, Fe, Na, Zn, Ca, and other elements that can support the height growth of stevia plants (Kristina and Syahid, 2012). Old coconut water also contains the hormones cytokinin, auxin and gibberellin which can support leaf growth in stevia plants (Mudaningrat and Nada, 2021). Old coconut water contains enough N, P and K elements to help plant metabolism in forming new organs, such as leaves (Atmaja, 2017). This shows that the higher the concentration of old coconut water added, the higher the number of leaves in stevia. Based on the analysis carried out by Rosniawaty et al (2017), old coconut water contains 0.018% N, 13.85% P, 0.12% K, 0.002% Na, 0.006% Ca, 0.005% Mg, 4.52% C org, 0.0039% auxin, 0.0018 gibberellin, 0.0017 cytokinin.

CONCLUSIONS

The interaction between the use of different types of irrigation and the provision of mature coconut water gave non-significantly different results for all research variables. The use of different types of irrigation can provide very significantly different results regarding plant height, number of leaves, wet weight of harvest, and dry weight of harvest; gave significantly different results on root length; and gave insignificantly different results on the wet weight of the plant. The type of irrigation that gives the best results is the use of drip irrigation. Giving old coconut water gave non-significantly different results for all research variables.

REFERENCES

Adhiguna, RT and A. Rejo. 2018. Drip Irrigation Technology in Optimizing Water Use Efficiency on Agricultural Land. *Proceedings of the National Seminar on World Water Day* . 1(1): 107-116.

Central Statistics Agency (BPS). 2020. *Executive Summary of Indonesian Population Expenditure and Consumption* . CV. Dharmaputra.

Borut, RN, OW Angkejaya, and PY Silalahi. 2021. Knowledge, Attitudes and Behavior of Coastal Communities Regarding Coconut Water as a Rehydration Fluid in Tonu Jaya Village in 2018. *Pattimura Medical Review.* 3(1): 33-45.

Edo, B. And M. Murdaningsih. 2018. The Effect of Providing Coconut Water on the Growth and Yield of Ground Water Spinach (*Ipomoea reptans*). *Agrica* . 11(1): 30-42.

Fallovo, C., Y. Rouphael, M. Cardarelli, E. Rea, A. Battistelli, and G. Colla. 2009. Yield and Quality of Leafy Lettuce in Response to Nutrient Solution Composition and Growing Season. *J. Food Agric. Environ* . 7(2): 456-462.

Firmansyah, E. 2017. Growth and Morphology of Palm Oil (Elaeis guinensis jacq.) Root Under Different Waterlogging Salinity. *AGROISTA Journal of Agrotechnology.* 1(2): 181-191.

Haryati, U. 2014. Supplemental Irrigation Technology for Adapting to Climate Change in Dry Land Agriculture. *Journal of Land Resources* . 8(1): 43-57.

Heksaputra, D., Z. Naimah, Y. Azani, and L. Iswari. 2013. Determining the Effect of Climate on Plant Growth with Naive Bayes. In *National Seminar on Information Technology Applications (SNATI).* N34-N39.

Hidayat, N. 2008. Growth and Production of Peanuts (*Arachis hypogea* L.) Local Madura Varieties at Various Planting Distances and Phosphorus Fertilizer Doses. *Agrovigor: Journal of Agroecotechnology* . 1(1): 55-64.

Idealistiana, L., N. Anggaraeni, and R. Khairiyah. 2021. Efforts to Increase Community Knowledge Regarding Limiting Sugar, Salt and Fat Consumption through Nutrition Counseling Activities in the Margajaya Health Center Area. *Journal of Community Service in Midwifery.* 4(1): 6-13.

Karim, H., AI Suryani, Y. Yusuf, and NA K Fatah. 2019. Growth of Cayenne Pepper (*Capsicum frutescens* L.) Plants on the Application of Liquid Organic Fertilizer from Kepok Banana Waste. Indonesian *Journal of Fundamental Sciences* . 5(2): 89-101.

Kosma, C., V. Triantafyllidis, A. Papasavvas, G. Salahas, and A. Patakas. 2013. Yield and Nutritional Quality of Greenhouse Lettuce as Affected by Shading and Cultivation Season. *Emirates Journal of Food and Agriculture.* 25(12): 974-979.

Krestiani, V., H. Supriyo, and MA Hidayat. 2022. Study of Types of Planting Media and Nutrient Concentrations of AB Mix on the Growth and Yield of Lettuce Plants (*Lactuca sativa* L) in the Hydroponic Drip Irrigation System. Muria *Journal of Agrotechnology (MJ-Agrotechnology).* 1(1): 22-29.

Krisna, B., EETS Putra, R. Rogomulyo, and D. Kastono. 2017. Effect of Oxygen and Calcium Enrichment on Root Growth and Yield of Curly Lettuce (*Lactuca sativa* L.) in Floating Raft Hydroponics. *Vegetalica* . 6(4): 14-27.

Kristina, NN and SF Syahid. 2012. Effect of Coconut Water on In Vitro Shoot Multiplication , Rhizome Production, and Xanthorrhizol Content of Temulawak in the Field. *Littri* . 18(3): 125-134.

Lestari, IGAAI 2014. Characteristics of Expansive Clay Soil. *GaneÇ Swara* . 8(2): 15-19.

Lutfia, U., R. Rugayah, K. Hendarto, and TD Andalasari. 2017. Growth Response of Red Dragon Fruit (*Hylocereus costaricensis*) Stem Cuttings to Provision of Coconut Water. *Journal of Applied Agricultural Research* . 17(3): 149-156.

Sembiring, BE, and L. Mawarni. 2017. Growth and Production of Samosir Variety Shallots (*Allium ascalonicum* L.) at various coconut water concentrations and soaking times. *Online Journal of Agroecotechnology.* 5(4): 780-785.

Mudaningrat, A., and S. Nada. (2021, October). Effect of concentration of growth regulators in coconut water on the growth of ginger (*Zingiber officinale*) and galanga (*Kaempferia galanga* L.) plants. In *National Biology Seminar* (Vol. 9, pp. 1-9).

Mustawa, M., SH Abdullah, and GMD Putra. 2017. Analysis of the Efficiency of Drip Irrigation on Various Soil Textures for Mustard Plants (*Brassica juncea*). *Scientific Journal of Agricultural and Biosystem Engineering* . 5(2): 408-421.

Negara, IDGJ, Y. Saadi, and IG Putra. 2015. Characteristics of Mini Sprinkler Irrigation Performance on the North Pringgabaya Dry Land in East Lombok Regency: Characteristics of Mini Sprinkler Irrigation Performance on The North Pringgabaya Dry Land in The East Lombok Regency. *Civil Spectrum* . 2(1): 28-37.

Pal, PK, R. Kumar, V. Guleria, M. Mahajan, R. Prasad, V. Pathania, BS Gill, D. Singh, G. Chand, B. Singh, RD Singh, and PS Ahuja. 2015. Crop-Ecology and Nutritional Variability Influence Growth and Secondary Metabolites of Stevia rebaudiana Bertoni. *BMC Plant Biology* . 15(1): 1-16.

Prasetya, MHE, MD Maghfoer, and M. Santoso. 2014. The Effect of Types and Combinations of Organic Materials on the Growth and Yield of Stevia Plants (*Stevia rebaudiana* B.). *Journal of Crop Production* . 2(6): 503-509.

Purba, DW 2017. Growth and Production Response of Pakcoy Mustard Plants (*Brassica juncea* L.) to Provision of Dophosf G-21 Organic Fertilizer and Old Coconut Water. *AGRIUM: Journal of Agricultural Sciences* . 21(1): 8-19.

Putra, A., Ichwana, and S. Chairani. 2017. Efficiency of Water Distribution Uniformity from Varying Pipe Height in Bulk Irrigation Systems. *Agricultural Student Scientific Journal* . 2(2): 430-438.

Rahmawati, D., H. Setiawan, and K. Aji. 2015, November. Design of an Automatic Sprinkling Microirrigation System based on Fuzzy Logic. In *National Seminar on Applied Technology (MACHINE)* (Vol. 1, No. 01).

Rezky, FL 2018. Effect of the amount of water applied using a drip irrigation system on the growth and yield of purple eggplant plants (*Solanum melongena* L.). AGROHITA Journal: *Agrotechnology Journal, Faculty of Agriculture, Muhammadiyah University, South Tapanuli* . 2(2): 10-19.

Rianditya, OD and S. Hartatik, S. 2022. The Effect of Providing Phosphorus Fertilizer on the Vegetative Growth of Sugarcane Plants Var. Mutation Result of Bululawang. *Agricultural Scientific Periodicals* . 5(1): 52-57.

Riski, M., and R. Ramli. 2022. Growth and Yield of Lettuce Plants (*Lactuca sativa* L.) by Providing Coconut Water in a Substrate Hydroponic System. *Agrotekbis: E-Journal of Agricultural Sciences* . 10(2): 397-405.

Rosniawaty, S., IRD Anjarsari and R. Sudirja. 2017. Cytokinin Application to Increase Tea Plant Growth in the Lowlands. *Journal of Industrial and Refreshing Plants* . 5(1): 31-38

Rosniawaty, S., M. Ariyanti, C. Suherman, R. Sudirja, and S. Fitria. 2020, February. Utilization of Coconut Water Waste to Increase Cocoa Growth Seedling by Different Application Methods and

Intervals. In *IOP Conference Series: Earth and Environmental Science* (Vol. 653, No. 1, p. 012081). IOP Publishing.

Setyanti, YH, S. Anwar, and W. Slamet. 2013. Photosynthetic Characteristics and Phosphorus Uptake of Alfalfa (*Medicago sativa*) Forages at Different Mowing Heights and Nitrogen Fertilization. *Animal Agriculture Journal* . 2(1): 86-96.

Setyawati, L., M. Marmaini, and YP Putri. 2020. Growth response of Pakcoy mustard greens (*Brassica chinensis* L.) to the provision of old coconut (*Cocos nucifera*) water. *Indobioscience* . 2(1): 1-6.

Sumanto, NL and AE Purba. 2019. The Effect of Providing Natural Growth Regulators on the Growth of Stevia (*Stevia rebaudiana* B) Cuttings. Bioscientist: *A Scientific Journal of Biology* . 7(2): 138-145.

Wahyono, ND, N. Hasanah, and N. Nurprahastani. 2021. Optimization of Sterilization Techniques and Effects of Coconut Water for the Induction of Shoots of Stevia (*Stevia rebaudiana* Bertoni). *Food and Agricultural Sciences: Polije Proceedings Series* . 3(1): 10-18.

Witman, S. 2021. Application of Drip Irrigation Methods to Support Efficient Water Use on Dry Land. *Triton Journal* . 12(1): 20-28.