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Mohamed A Abd El-Wahab
Medicinal and Aromatic Plants Department, Desert Research Center, Cairo, Egypt

Moustafa YM Badawy
Medicinal and Aromatic Plants Department, Desert Research Center, Cairo, Egypt

Wafaa H Abd El-Aleem
Medicinal and Aromatic Plants Department, Desert Research Center, Cairo, Egypt

Saber M Bakeer
Plant Production Department, Desert Research Center, Cairo, Egypt

Corresponding Author:
Moustafa YM Badawy
Medicinal and Aromatic Plants Department, Desert Research Center, Cairo, Egypt

Studying the effect of mixtures of agricultural soil on two *Stevia* cultivars under a hydroponic system

Mohamed A Abd El-Wahab, Moustafa YM Badawy, Wafaa H Abd El-Aleem and Saber M Bakeer

Abstract
Stevia as a sweetener substitute for sugar represents a significant impact on human health, especially on diabetics and children, which prompts finding a way to improve and increase its productivity with high quality. In this study, two *Stevia* cultivars were grown in more than cultivation media under hydroponic conditions to obtain the highest yield of dry leaves and the highest content of sweeteners. The experiment was laid out according to a split-plot arrangement. Cultivation media was kept in the main plot, whereas *Stevia* cultivars were randomized in sub-plots. The first factor of the hydroponic planting media was that six different mixtures of different agricultural soils such as sand, silica, perlite, peat moss, and vermiculite were used as treatments from S_1 to S_6. The second factor was two varieties of *Stevia*, *Stevia rebaudiana*, cv Sugar High-A3 (V_1), and *Stevia rebaudiana*, cv Morita (V_2). The results indicated that cultivation media had an influence very evident on plant height, number of branches/plant, leaf fresh weight/plant, leaf fresh weight/m^2, dry weight/plant, and leaf dry weight/m^2. The highest values were recorded with the S_6 treatment (sand + perlite + peat moss), especially with *Stevia rebaudiana*, cv Morita, and S_5 (sand + perlite + peat moss + vermiculite), especially with *Stevia rebaudiana*, cv Sugar High-A3. Concerning the effect of varieties, the superiority of *Stevia rebaudiana*, cv Morita over *Stevia rebaudiana*, cv Sugar High-A3 was noticed in all vegetative measurements, especially the yield of fresh and dry leaves and the content of stevioside in leaves. Regarding the interaction between cultivation media and varieties of *Stevia*, the best treatment was cultivating *Stevia rebaudiana*, cv Morita in media containing sand, perlite, and peat moss (V_2S_6) to produce the highest yields of fresh and dry leaf regularly in all cuts. Also, using S_3 (sand+ silica+ perlite + peat moss + vermiculite) led to obtaining the highest content of sweeteners in the two varieties, especially the stevioside.

Keywords: Hydroponics; *Stevia rebaudiana*, cv sugar high-a3, *Stevia rebaudiana*, cv morita, sand, perlite, peat moss, vermiculite, stevioside

Introduction
Stevia is a perennial plant and is well-known for its high content of steviol glycoside in dry leaf matter responsible for providing the non-caloric value sweet taste. Stevioside is the ideal sugar substitute. Stevioside is 100 to 300 times sweeter than table sugar and has been clinically tested. It is frequently used by humans without adverse effects and is an ideal, nonadditive sweetener for children and pharmaceutical industries [1, 2].

Hydroponics is a technology for growing plants in nutrient solution (water containing fertilizers) with or without an artificial medium (sand, gravel, vermiculite, rockwool, perlite, peat moss, coir, or sawdust) to provide mechanical support for liquid hydroponic systems have no other support. Hydroponic systems are further categorized as open (i.e., once the nutrient solution is delivered to the plant roots, it is not reused) or closed (i.e., the surplus solution is recovered, replenished, and recycled) [3]. Hydroponics growing systems have been developed to get higher yield and quality, preserve water and land, save labor, and protect the environment through reduced pesticides. Essential advantages of hydroponics culture, especially the closed systems, are the excess nutrient solution is recovered, management and reduction of waste material, less pollution of ground and surface water, more efficient use of water and fertilizer, the buffer capacity for making mistakes and lower costs [4].

Cultivation without soil is the science that uses inert material such as gravel, sand, peat, vermiculite, pumice, sawdust, coco peat, vermicompost, etc. The nutrient solution is added, containing all the essential elements. The plant needs these elements to fulfill its nutrients requirements for its average growth and development [5, 6].

The size and shape of particle size distribution help estimate

the hydraulic properties of the media. The substrate under a long cultivation period causes an increase in organic matter content and microorganism activity, leading to increased competition for oxygen in the root environment [7]. These media should guarantee better rooting conditions, provide anchorage for the root system, supply water, and nutrients to plants, and offer a suitable aeration environment for roots. [8] showed that most growers use locally available substrates as it is cheap and reliable. Coir, a natural fiber material extracted from coconut husk, is most prevalent in tropical and subtropical areas. Essentially, an effective growing medium must have a physical structure capable of sustaining a favorable balance between air and water storage both during and between irrigation events to prevent root asphyxia and drought stress [9].

Peat is the most widely used substrate for potted plant production in the nurseries and accounts for a significant portion of the materials used to grow potted plants [10, 11]. The media selection is based on many factors such as existence, ease of use, and cheapness for producers. The different media types can be used as peat. Recently, coco peat (coconut fiber), rock wool, vermiculite, perlite, expanded clay, pumice, sand, etc. have been used in different proportions [12].

Soils of different types affect crop production according to their capability as nutrient suppliers based on plant requirements. Soil provides physical support to plants and supplies necessary water and nutrient elements for plant growth and development. Leaf biomass yield of *Stevia* (*Stevia rebaudiana*, Bertoni) increased, ranging from 16 to 18% in peat soil [13].

In this work, we will use the closed system of Dutch pocket, aiming to investigate two *Stevia* cultivars' productivity and several media to produce the highest yield.

Material and methods

Location

The experiment was carried out on a private farm in the Oraby association, Al-Eubour (30˚ 13′ 58" N, 31˚ 32′ 32" E), Egypt, for two consecutive years (2020 and 2021), using a circulatory Dutch pocket system inside a greenhouse. The greenhouse conditions were as follows: average day and night temperatures were 28 and 23˚C, respectively; this was done through cooling systems during the summer months, and the relative humidity was ~65%. The greenhouse covered a translucent polycarbonate sheet with 75% full sunlight.

Dutch pocket cultivation structure

The plants were grown in containers with a capacity of 18 liters with dimensions of 30 x 30 cm and a height of 40 cm. The containers were directed towards the nutrient solution recovery tank with a slope of 2%. The drain pipe was installed in the middle of the bottom container. The drainage for each container was connected to the main drainage line placed in the middle line. The containers were on their sides. The drainage opening of each container was covered with gauze to prevent leakage of soil granules and to protect the drainage pipe opening from blockage, which has the functions of aeration and realization of nutrient solution recycling. After filling the different planting soil mixtures, the containers were rinsed with fresh water several times to remove excess salinity and fine sand. Six of the cultivation media were used and were as follows:

S_1= silica + perlite + peat moss + vermiculite (1:1:1:1 v/v).
S_2= silica + perlite + peat moss (1:1:1 v/v).
S_3=sand + silica + perlite + peat moss + vermiculite (1:1:1:1:1 v/v).
S_4= sand + silica + perlite + peat moss (1:1:1:1 v/v).
S_5= sand + perlite + peat moss + vermiculite (1:1:1:1 v/v).
S_6= sand + perlite + peat moss (1:1:1 v/v).

Plant growth conditions and experimental design

In December of two seasons, seeds of the two cultivars of *Stevia rebaudiana*, cv Sugar High-A3 (V_1) and *Stevia rebaudiana*, cv Morita (V_2) (obtained from the Institute of Sugar Crops Research, Giza, Egypt). They were sown in a potting media mixture of perlite, vermiculite, and peat moss (1:1:1 v/v). After two and a half months (mid-February), at the 6-8 leaf stage, with plant height ranging from 6 to 8 cm, seedlings were transplanted into Dutch pocket system troughs connected to 10000 l tank containing nutrient solution (1 mM KNO_3; 1 mM $Ca(NO_3)_2$; 1 mM $NH_4H_2PO_4$; 1 mM $(NH_4)_2HPO_4$; 1 mM $MgSO_4$; 0.02 mM Fe-EDTA; 0.025 mM H_3BO_3; 0.05 mM KCl; 0.002 mM $MnSO_4$; 0.002 mM $ZnSO_4$; 0.0005 mM $CuSO_4$; 0.0005 mM MoO_3 [14]. One seedling was planted in each container. The drip irrigation system was applied in the whole experiment using droppers (4 l/h) every day (for half an hour, divided into two times). The nutrient solution was constantly modified to avoid nutrients depletion.

Harvesting and data recorded

In each season, three cuts were taken on June 25th, August 20th, and November 5th for the first season and June 30th, August 30th, and November 15th for the second season by cutting the vegetative parts of all plants 10 cm above the soil surface. Plant height, number of branches/plant, leaf fresh weight/plant, leaf fresh weight/m^2, dry weight/plant, and leaf dry weight/m^2 were recorded. The contents of stevioside and rebaudioside A in leaves of the second season were estimated in the first and second cuts, respectively.

Statistical analysis

The experiment was laid out according to a split-plot design. Cultivation media was kept in the main plots, whereas *Stevia* cultivars were randomized in sub-plots. Each treatment had three replications. The collected data from both seasons were analyzed by LSD test and presented.

Results and Discussion

I. Effect of cultivation media

The impact of cultivation media on vegetative growth parameters (plant height, number of branches/plant, leaf fresh and dry weights/plant, leaf fresh and dry weights/m^2) was shown in Tables (1-6). It was clear that there were significant variations within different media. The significant-top values were given using S_5 (sand+ perlite+ peat moss + vermiculite) and S_6 (sand+ perlite+ peat moss). However, their differences were non-significant, with the most important characteristics: leaf fresh and dry weights/plant and leaf fresh and dry weights/m^2.

Concerning S_5 treatment (sand+ perlite+ peat moss + vermiculite), its detections for leaf fresh weights/plant were 71.00, 265.42, 293.62 g; leaf fresh weights/m^2 were 426.00, 1592.51, 1761.67 g; leaf dry weights/plant were 29.50, 71.04, 84.48 g; leaf dry weights/m^2 were 177.00, 426.25, 506.88 g in connection with the first cut, second cut, and third cut, respectively. About S_6 treatment (sand+ perlite+ peat moss), its readings for leaf fresh weights/plant were 78.50, 278.20, 288.34g; leaf fresh weights/m^2 were 471.00, 1669.17, 1730.01g; leaf dry weights/plant were 28.00, 68.89, 91.46g; leaf dry weights/m^2 were 168.00, 413.33, 548.75g for the first

cut, second cut, and third cut, in that order. On the other hand, using any other media provided lower measurements.

The merit of S_5 (sand+ perlite + peat moss+ vermiculite) and S_6 (sand+ perlite + peat moss) media can be attributed to the following reasons. Peat moss is an organic matter with the highest capacity for holding water and, consequently, nutrients. Sand is significant chemical neutrality. It can be helpful in a mixture when it is necessary to lower the moisture-holding capacity of the substrate. Perlite is beneficial in a hydroponic system, as the air within its pores helps keep the system oxygenated. Perlite has a neutral pH so that it won't affect or interact with the water or liquid nutrients used within the system. Vermiculite is a mineral that has been superheated until it has expanded into light pebbles. Vermiculite holds more water than perlite and has the natural property to draw water and nutrients into a passive hydroponic system [15, 16, 17].

The effect of cultivation media type on the growth of *Stevia* under hydroponic conditions was in agreement with the work of [18, 2]. Also, these results were in harmony with other literature by [19] on gypsophila; [20] on leafy greens; [21] on mustard.

II. Effect of varieties

Data presented in Tables (1-6) displayed the influence of grown varieties on different vegetative growth traits (plant height, number of branches/plant, leaf fresh and dry weights/plant, leaf fresh and dry weights/m^2). It was evident in both seasons that the second variety (*Stevia rebaudiana*, cv Morita) recorded the significant highest parameters over the first one (*Stevia rebaudiana*, cv Sugar High-A3).

Stevia rebaudiana, cv Morita detections for plant height were 56.39, 88.24, 99.22 cm; the values for the number of branches/plant were 6.31, 25.22, 29.14 branches; the leaf fresh weights/plant were 71.50, 294.82, 309.36 g; the leaf fresh weights/m^2 were 429.00, 1768.89, 1856.12 g. The leaf dry weights/plant findings were 22.83, 72.22, 87.64 g; leaf dry weights/m^2 were 137.00, 433.33, 525.82 g for the first cut, second cut, and third cut, respectively. In contrast, *Stevia rebaudiana*, cv Sugar High-A3 gave lower measurements.

The *Stevia* varieties lack high-value adapted and traceable varieties, and the development of new cultivars is very recent and should be evaluated. The existing dissimilarities in different *Stevia* traits were attributed to genetic variability among the investigated types as demonstrated by [22, 23, 24, 25]. They also found significantly morphological measures among cultivars.

III. Effect of interaction between cultivation media and varieties

The experiment data revealed a positive interaction among planted varieties and cultivation media. The best treatment was cultivating *Stevia rebaudiana*, cv Morita in media containing sand, perlite, and peat moss (V_2S_6) to produce the highest yield regularly in all cuts. These could be discussed as the following:

The maximum increments in plant height were found by S_6 (60.67 cm) and S_4 (59.56 cm), S_6 (96.22 cm) and S_4 (92.44 cm), S_6 (100.56 cm) and S_4 (100.11 cm) for the first cut, second cut, and third cut, individually. The differences between S6 and S4 were non-significant. The greatest number of branches/plants were from S_5 (8.00), S_6 (37.67), and S_6 (43.32) for the first cut, second cut, and third cut, separately.

The heaviest fresh weights/plant were observed by S6 (100.00 g), S6 (399.72 g), and S4 (394.17 g), S6 (388.34 g), and S4 (378.06 g) for first, second, third cuts, respectively. The variations between S4 and S6 were insignificant in the second and third cuts. The highest fresh weights/m^2 were harvested from S6 (600.00 g), S6 (2398.33 g) and S4 (2365.00 g), S6 (2330.01 g), and S4 (2268.33 g) related to first, second and third cuts in that order. The differences between S4 and S6 were insignificant in the second and third cuts.

The weightiest dry weights/plant were taken by S_6 (34.00 g) and S_5 (31.00 g), S_6 (84.44 g) and S_5 (80.83 g), S_6 (115.75 g) for first, second and third cuts, respectively. The variations between S_5 and S_6 were non-significant in the first and second cuts. The highest dry weights/m^2 were gained from S_6 (204.00 g) and S_5 (186.00 g), S_6 (506.67 g) and S_5 (485.00 g), and S_6 (694.50 g) for first, second and third cuts. The differences between S_5 and S_6 were insignificant in the first and second cuts.

The highest parameters for V_2S_6 treatment because the second variety (*Stevia rebaudiana*, cv Morita) was more adapted also for the composition of media, which all enhanced growth, as mentioned before. These relations between media and cultivars on plants' productivity under hydroponic circumstances were agreed with research by [26] on strawberries; [27] on tomatoes; [28] on lettuce crop.

Table 1: Effect of cultivation media and variety of *Stevia rebaudiana* plants on plant height, during 2020 and 2021 seasons.

Treatments	Plant height (cm)								
	First cut			Second cut			Third cut		
	V_1	V_2	Mean	V_1	V_2	Mean	V_1	V_2	Mean
S_1	49.00	49.89	49.45	73.33	85.44	79.39	85.00	99.00	92.00
S_2	49.22	54.56	51.89	70.44	85.67	78.06	79.11	99.22	89.17
S_3	54.22	56.33	55.28	76.67	86.56	81.62	90.38	98.78	94.58
S_4	53.11	59.56	56.34	73.67	92.44	83.06	83.33	100.11	91.72
S_5	59.78	57.34	58.56	79.11	83.11	81.11	93.33	97.67	95.50
S_6	49.44	60.67	55.06	76.78	96.22	86.50	79.56	100.56	90.06
Mean	52.46	56.39		75.00	88.24		85.12	99.22	
L.S.D at 0.05									
V	1.9			2.71			1.75		
S	3.28			4.69			3.02		
V × S	4.63			6.63			4.27		

Table 2: Effect of cultivation media and variety of *Stevia rebaudiana* plants on number of branches/plant, during 2020 and 2021 seasons.

Treatments	No of branches								
	First cut			Second cut			Third cut		
	V_1	V_2	Mean	V_1	V_2	Mean	V_1	V_2	Mean
S_1	5.50	5.78	5.64	17.89	21.00	19.45	19.68	24.15	21.92
S_2	4.22	4.89	4.56	14.56	20.00	17.28	16.74	23.80	20.27
S_3	5.50	6.00	5.75	23.44	23.78	23.61	26.83	27.34	27.09
S_4	6.11	6.50	6.31	22.89	24.89	23.89	24.92	29.37	27.15
S_5	6.34	8.00	7.17	27.67	24.00	25.84	31.82	26.84	29.33
S_6	5.66	6.67	6.17	21.89	37.67	29.78	26.45	43.32	34.89
Mean	5.56	6.31		21.39	25.22		24.41	29.14	
L.S.D at 0.05									
V	0.31			1.07			1.32		
S	0.53			1.86			2.28		
V × S	0.74			2.62			3.22		

Table 3: Effect of cultivation media and variety of *Stevia rebaudiana* plants on leaf fresh weight/plant, during 2020 and 2021 seasons.

Treatments	Fresh weight/plant (g)								
	First cut			Second cut			Third cut		
	V_1	V_2	Mean	V_1	V_2	Mean	V_1	V_2	Mean
S_1	35.00	41.00	38.00	178.89	223.06	200.98	200.00	247.78	223.89
S_2	34.00	47.00	40.50	147.50	247.22	197.36	104.44	301.11	202.78
S_3	62.00	82.00	72.00	241.11	254.72	247.92	295.00	272.50	283.75
S_4	58.00	83.00	70.50	178.89	394.17	286.53	229.72	378.06	303.89
S_5	66.00	76.00	71.00	280.84	250.00	265.42	318.89	268.34	293.62
S_6	57.00	100.00	78.50	156.67	399.72	278.20	188.34	388.34	288.34
Mean	52.00	71.50		197.32	294.82		222.73	309.36	
L.S.D at 0.05									
V	2.83			13.27			17.5		
S	4.9			22.98			30.31		
V × S	6.92			32.49			42.86		

Table 4: Effect of cultivation media and variety of *Stevia rebaudiana* plants on leaf fresh weight/m^2, during 2020 and 2021 seasons.

Treatments	Fresh weight/m^2 (g)								
	First cut			Second cut			Third cut		
	V_1	V_2	Mean	V_1	V_2	Mean	V_1	V_2	Mean
S_1	210.00	246.00	228.00	1073.33	1338.33	1205.83	1200.00	1486.67	1343.34
S_2	204.00	282.00	243.00	885.00	1483.33	1184.17	626.67	1806.67	1216.67
S_3	372.00	492.00	432.00	1446.66	1528.33	1487.50	1770.00	1635.00	1702.50
S_4	348.00	498.00	423.00	1073.33	2365.00	1719.17	1378.33	2268.33	1823.33
S_5	396.00	456.00	426.00	1685.01	1500.00	1592.51	1913.33	1610.01	1761.67
S_6	342.00	600.00	471.00	940.01	2398.33	1669.17	1130.01	2330.01	1730.01
Mean	312.00	429.00		1183.89	1768.89		1336.39	1856.12	
L.S.D at 0.05									
V	16.96			56.27			104.98		
S	29.37			137.84			181.84		
V × S	41.53			194.93			257.16		

Table 5: Effect of cultivation media and variety of *Stevia rebaudiana* plants on leaf dry weight/plant, during 2020 and 2021 seasons.

Treatments	Dry weight/plant (g)								
	First cut			Second cut			Third cut		
	V_1	V_2	Mean	V_1	V_2	Mean	V_1	V_2	Mean
S_1	8.00	10.00	9.00	38.61	38.06	38.34	66.44	67.81	67.13
S_2	13.00	14.00	13.50	39.72	72.50	56.11	34.36	81.47	57.92
S_3	22.50	24.33	23.42	56.67	76.67	66.67	83.84	87.44	85.64
S_4	21.33	23.67	22.50	55.36	80.83	68.10	72.83	92.64	82.74
S_5	28.00	31.00	29.50	61.25	80.83	71.04	88.25	80.71	84.48
S_6	22.00	34.00	28.00	53.33	84.44	68.89	67.17	115.75	91.46
Mean	19.14	22.83		50.82	72.22		68.82	87.64	
L.S.D at 0.05									
V	2.17			3.95			7.59		
S	3.75			6.84			13.15		
V × S	5.3			9.67			18.59		

Table 6: Effect of cultivation media and variety of *Stevia rebaudiana* plants on leaf dry weight/m^2, during 2020 and 2021 seasons.

Treatments	Dry weight/m^2 (g)								
	First cut			Second cut			Third cut		
	V 1	V2	Mean	V 1	V2	Mean	V 1	V2	Mean
S1	48.00	60.00	54.00	231.67	228.33	230.00	398.67	406.83	402.75
S2	78.00	84.00	81.00	238.33	435.00	336.67	206.17	488.83	347.50
S3	135.00	146.00	140.50	340.01	460.00	400.01	503.01	524.67	513.84
S4	128.00	142.00	135.00	332.14	485.00	408.57	437.00	555.83	496.42
S5	168.00	186.00	177.00	367.50	485.00	426.25	529.50	484.25	506.88
S6	132.00	204.00	168.00	319.99	506.67	413.33	403.00	694.50	548.75
Mean	114.83	137.00		304.94	433.33		412.89	525.82	
L.S.D at 0.05									
V	13.00			23.69			45.53		
S	22.5			41.04			78.86		
V × S	31.82			58.04			111.52		

It was evident from Table (7) that the highest content of sweeteners appeared with both varieties with the use of media S3 (sand + silica + perlite + peat moss + vermiculite) in the two cuts, except for the first variety in the first cut only, the highest content was (28.32%) with the use of media S2 (silica + perlite + peat moss). It was followed by (11.3%) with media S3 (sand+ silica+ perlite + peat moss + vermiculite), where the second cultivar (*Stevia rebaudiana*, cv Morita) (19.11 and 16.72% first and second cuts, respectively) recorded the highest content (13.12%) in the second cut with *Stevia rebaudiana*, cv Sugar High-A3. Therefore, the media S3 is considered the best media used in *Stevia* cultivation to obtain the highest content of sweeteners. The same results were achieved with stevioside content regarding cultivars and media. We found that *Stevia rebaudiana*, cv Sugar High-A3 recorded the highest range (18.22%) in the first cut with media S2 only**.** In contrast, in the second cut, it recorded (7.77%) with media S3. At the same time, we found the *Stevia rebaudiana*, cv Morita recorded the highest content in the first and second cuts, respectively, with S3 (16.47 and 14.62% first and second cuts, respectively).

It also showed the superiority of *Stevia rebaudiana*, cv Morita in general with all media compared to *Stevia rebaudiana*, cv Sugar High-A3 in its high content of sweeteners. It was clear that the high content of *Stevia rebaudiana*, cv Morita of stevioside compared to *Stevia rebaudiana*, cv Sugar High-A3 in all media**.** On the contrary, the high range of the first variety of rebaudioside compared to the second variety in all cultivation media and all cuts. For *Stevia rebaudiana*, cv Morita, the Reb A/Stev ratio was consistently higher in the two cuts with S2, where it gave (0.36 and 0.32 first and second cuts, respectively). In contrast, *Stevia rebaudiana*, cv Sugar High-A3 achieved it with the same media in the second cut and recorded (1.09), while the highest percentage of 0.96 was recorded with media S3 in the first cut.

Table 7: Effect of cultivation media and variety of *Stevia rebaudiana* plants on stevioside and rebaudioside A content, during 2020 and 2021 seasons.

Treatments	Sweeteners content							
	V1				V2			
	Stevioside (%)	Rebaudioside A (%)	Total Svglys (percent of leaf dry matter)	Reb A/Stev Ratio	Stevioside (%)	Rebaudoside A (%)	Total Svglys (percent of leaf dry matter)	Reb A/Stev Ratio
	First cut							
S1	6.78	3.33	10.11	0.49	7.65	2.66	10.31	0.35
S2	18.22	10.10	28.32	0.55	7.27	2.60	9.87	0.36
S3	5.76	5.54	11.3	0.96	16.47	2.64	19.11	0.16
S4	5.51	4.02	9.53	0.73	13.51	3.14	16.65	0.23
S5	6.47	3.89	10.36	0.60	14.17	2.96	17.13	0.21
S6	6.39	4.91	11.3	0.77	13.21	2.88	16.09	0.22
	Second cut							
S1	5.58	2.95	8.53	0.53	11.20	1.56	12.76	0.14
S2	4.33	4.72	9.05	1.09	8.21	2.62	10.83	0.32
S3	7.77	5.35	13.12	0.69	14.62	2.10	16.72	0.14
S4	3.80	3.88	7.68	1.02	10.11	2.50	12.61	0.25
S5	6.56	3.61	10.17	0.55	11.65	3.72	15.37	0.32
S6	6.59	4.69	11.28	0.71	12.14	4.03	16.17	0.33

Conclusions

Under the hydroponic system (Dutch pocket), it clearly showed the superiority of *Stevia rebaudiana*, cv Morita over *Stevia rebaudiana*, cv Sugar High-A3 in all vegetative measurements, especially the yield of fresh and dry leaves and the content of leaves from stevioside. While *Stevia rebaudiana*, cv Sugar High-A3 was superior in its content of rebaudioside A compared to *Stevia rebaudiana*, cv Morita. It was also found that the cultivation of *Stevia rebaudiana*, cv Morita in the cultivation media of S6 (sand+ perlite+ peat moss) gave the most significant results than planting in the rest of the cultivation media. Meanwhile, *Stevia rebaudiana*, cv Sugar High-A3, always recorded the highest measurements with the cultivation media S5 (sand+ perlite+ peat moss + vermiculite) compared with other media. Regarding the cultivation media, S3 (sand+ silica+ perlite+ peat moss+ vermiculite) was considered the best media used in *Stevia* cultivation to obtain the highest percent of sweeteners in this experiment.

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