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Botanical Evaluation of Some Stevia (*Stevia rebaudiana*, Bertoni) Varieties under Different Nitrogen fertilizer Levels.

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Abstract

Two field experiments were carried out at agricultural research center Giza Egypt. During 2015/2016 and 2016/2017 seasons to study the effect of nitrogen fertilizer levels (20, 30 and 40 kg N/ fed/cut.) on some stevia varieties (china1, Egy1, spanti and shou2) growth characters in both seasons. The highest nitrogen rate of 40 kg. N /fed /cut was significant in all studied growth and yield characters and gave the highest values as compared with the other two nitrogen treatments in both seasons.

stevia varieties were significantly different in all studied growth and yield characters. Egy1 varieties gave the highest values of all studied growth and yield characters except for Plant height and number of branches per plant where spanti cultivar gave the highest values in the first and second seasons.

Concerning the effect of the interaction between nitrogen fertilizer levels and stevia varieties on growth character values, nitrogen fertilizer level of 40 kg N/ fed/cut applied to Egy1 varietie gave the highest values in all the three cuts studied except those of plant height and number of branches in both seasons.

Key words: stevia, nitrogen fertilizer**,** varieties**.**

Introduction

Stevia has zero calorie natural sweetener to substitute sugar form ingredients in the food habits of human being. leaves of stevia plant is heat and pH stable. The leaves of the plant have a pleasantly sweet and refreshing taste which is induced by diterpene glycosides (stevioside and rebaudiosides), a high-potency sweeteners and substitute to sugar, being 300 times sweeter than sucrose (**Madan *et al.*, 2010; Megeji *et al.*, 2005; Singh and Rao, 2005; Soejarto *et al.*, Yadav *et al.*, 2011**). **S**ugar obtained from leaves of Stevia containing compounds about 250 times as sweet as table sugar (**Shock, 1982**) and 300 times sweeter than sucrose (**Noshiyama *et al.*,1991**). It was first recognized by Bertoni who later studied it and found that the plant was new to science, which he renamed as *Stevia rebaudiana*, Bertoni *Stevia rebaudiana, Bert. Stevia* is a genus of about 200 species of herbs and shrubs in the sunflower family (Asteraceae), and originated from South America. (**Soejarto 2002**), It's a natural sweet herb native of northeastern Paraguay and today it is cultivated around the world (**Savita *et al.*, 2004**). *Stevia* is a diploid plant, having 11 pairs of chromosome (**Frederico *et al.*, 1996**) with critical day length of 13 hours (**Zaidan *et al.*, 1980**) and its cultivation has spread worldwide. this line present investigation is initiated with the following objectives.To know the effect of different levels of nitrogen on growth and yield of stevia, tested Varieties effect on growth and yield of stevia and the interaction effects of different levels of nitrogen and tested Varieties s growth and yield of stevia.

Materials and methods

The present work was designed to study the variety and nitrogen levels on botanical and chemical traits of stevia (*stevia rebaudiana*, Bertani). Two experiments were carried out at Giza Experimental Station, Agricultural Research Center, Egypt during 2015/2016 and 2016/2017 growing seasons. The experimental treatments the combinations of three nitrogen levels and four tested varieties as follow:

Treatments

Two factors were studied as follow:

A: nitrogen fertilizer levels (N)

N1= 20 kg N fed/cut., N2 = 30 kg N fed/cut. and N3 = 40 kg N fed/cut.

B: Varieties (v):

V1 = China 1, V2 = Egy1, V3 = spanti and V4 = shou 2

Nitrogen fertilizer was in the form urea (46,5% N) and added in two equalra, rates the first rates was applied after 15 days from transplanting and the second dose was applied after 15 days from the first one. In the next cuts, the first dose was applied 15 days after cutting and the second rates was applied 15 days later. Potassium fertilizer was applied as potassium sulphate (48% K_2O) at the rate of 50kg/fed were during land preparation. Calcium superphosphate (15.5% P_2O_5) rate of 50kg/fed were during land preparation.

Field Experimental Design:

The experimental design used was a split plot design with three replicates. Fertilizer levels were arranged in the main plots and cultivars in the sub plots. The sub plot area was 10.8 m2 (6 ridges) 3.0 meters in length and 60 cm in width.

Table A. Physical and Chemical analysis of experimental soils in 2015/2016and 2016/2017 seasons.

Analysis	**Seasons**	
	2015/2016	**2016/2017**
Mechanical analysis		
Coasre sand %	0.20	0.50
Fine sand %	12.16	14.2
Silt %	48.85	45.7
Clay %	38.99	36.5
Textual class	Cilt clay loam	Cilt clay loam
Chemical analysis		
Organic matter %	1.08	1.32
CaCo3 %	1.10	2.0
PH(1:2.5)**	8.10	8.0
Soluble Ca++ (meq /100 g soil)	11.2	16.2
Soluble Mg++ (meq /100 g soil)	10.7	14.7
Soluble Na + (meq /100 g soil)	8.3	11.7
Soluble K + (meq /100 g soil)	4.1	2.6
Soluble Co3 --(meq /100 g soil)	--	--
Soluble Hco 3--(meq /100 g soil)	3.5	5.6
Soluble Cl--(meq /100 g soil)	13.3	17.9
Soluble So4--(meq /100 g soil)	17.3	31.7
Available N(ppm)	11.00%	13.9%
Available P(ppm)	9.12%	11%
Available K(ppm)	35.86%	34.1%

Studied characters

-plant height (cm).
- number of main branches /plant.
-Plant fresh weight (g)
-Plant dry weight (g).
- Leaves fresh weight (g)/plant.
-Dry leaves weight (g)/ plant. Leaves were dried under shade and kept at 60C for one hour in oven.
- leaves fresh weigh yield (t/ cut / fed).
- Dry leaves yield (ton/fed. cut)
- Dry leaves yield (ton/fed. Seasons). Total of the three cuts

Statistical analysis:

All collected data were statistically analyzed according to technique of analysis of variance for split- plot design by " GENSTAT Version 12th 2009 " computer software package (VSN International, Hemel Hempstead, UK) to determine The differences among treatment means were compared by L.S.D. test at $P \leq 0.05$ **Payne, *et al* (2009).** Combined analysis for the two seasons of experimentation was done according to the homogeneity of experimental error variance (**Bartlett, 1937).**

Results and Discussion

Effect of nitrogen fertilizer levels

Results in Table (1, 2, 3 and 4) indicate that plant height, number of main branches per plant, plant fresh weight, plant dry weight, leaves fresh weight per plant, dry leaves weight per plant, leaves fresh weigh yield, dry leaves yield and total leaves yield were significantly affected by increasing nitrogen fertilizer levels in the first and second seasons. The highest nitrogen rate of 40 kg N /fed/ cut gave the highest values as compared where the other nitrogen treatments of all studied characters in both seasons

Table 1. Effect of nitrogen fertilizer levels on plant height, number of main branches per plant, plant fresh weight, plant dry weight of stevia in 2015/2016 season.

Treatment	**Season 2015/2016**											
	plant height(cm)			**Number of main branches /plant**			**Plant fresh weight (g)**			**Plant dry weight (g)**		
	Cut1	Cut2	Cut3	Cut1	Cut2	Cut3	Cut1	Cut2	Cut3	Cut1	Cut2	Cut3
N1	56.62	38.8	24.83	9.67	11.25	9.57	194.5	72.5	51.12	59.68	25.0	16.66
N2	61.07	55.2	28.79	11.50	11.79	12.96	259.0	132.9	70.46	79.39	45.0	22.48
N3	64.83	73.5	34.33	11.83	14.42	14.75	387.5	178.7	98.0	107.48	51.8	27.94
Mean	60.84	55.8	29.32	11.0	12.49	12.43	280.3	128.0	73.19	82.19	40.6	22.36
L s d 0.05	4.141	3.78	3.476	1.716	1.5 81	2.795	30.33	12.32	12.211	6.471	1.981	4.366

N1: 20 kg N fed/cut. , **N2:** 30 kg N fed/cut , **N3**: 40 kg N fed/cut.

Table 2. Effect nitrogen fertilizer levels on plant height, number of main branches per plant, plant fresh weight, plant dry weight of stevia in 2016/2017 seasons.

Treatment	**2016/2017 Season**											
	plant height (cm)			**Number of main branches /plant**			**Plant fresh weight (g)**			**Plant dry weigh (g)**		
	Cut1	**Cut2**	**Cut3**	**Cut1**	**Cut2**	**Cut3**	**Cut1**	**Cut2**	**Cut3**	**Cut1**	**Cut2**	**Cut3**
N1	43.57	34.58	36.12	12.94	10.92	14.72	209.0	47.57	124.8	63.13	15.80	33.52
N2	47.27	35.25	41.44	13.50	12.42	16.08	265.3	64.34	149.1	80.66	20.23	42.94
N3	56.47	39.82	46.8	15.25	14.25	18.00	371.4	91.78	218.5	107.72	27.10	53.82
Mean	49.1	36.55	41.46	13.33	12.53	16.27	281.9	67.90	164.1	83.83	21.04	43.42
L s d 0.05	4.95	4.334	3.63	0.896	2.026	1.583	22.68	10.481	10.61	5.385	2.33	3.413

N1: 20 kg N fed/cut., **N2:** 30 kg N fed/cut, N**3**: 40 kg N fed/cut.

Table 3. Effect nitrogen fertilizer levels on fresh weight per plant, dry leaves weight per plant, leaves fresh weigh yield, dry leaves yield and total leaves yield of stevia 2015/2016 season.

Treatment	**2015/2016 Season**												
	Leaves fresh weight /plant (g)			**Dry leaves weight per plant(g)**			**Leaves fresh weight yield t/ cut / fed**			**Dry leaves yield t / cut/ fed**			**Total yield t/ fed /year**
	Cut1	**Cut2**	**Cut3**	**Cut1**	**Cut2**	**Cut3**	**Cut1**	**Cut2**	**Cut3**	**Cut1**	**Cut2**	**Cut3**	
N1	111.0	34.0	30.9	31.32	9.87	9.07	3.323	1.020	0.931	1.250	0.357	0.48	2.087
N2	161.6	49.8	43.28	45.87	13.47	12.54	4.743	1.494	1.304	1.697	0.495	0.552	2.743
N3	257.2	84.0	60.38	65.47	21.43	15.43	7.696	2.524	1.824	2.179	0.705	0.756	2.743
Mean	176.6	55.9	44.84	47.56	9.87	12.35	4.615	1.679	1.353	1.709	0.519	0.6	2.824
L s d 0.05	25.88	6.9	7.579	3.95	1.16	2.4	0.689	0.205	0.230	0.223	0.032	0.079	0.2622

N1: 20 kg N fed/cut., N**2:** 30 kg N fed/cut, N**3**: 40 kg N fed/cut

Table 4. Effect nitrogen fertilizer levels on fresh weight per plant, dry leaves weight per plant, leaves fresh weigh yield, dry leaves yield and total leaves yield of stevia in 2016/2017 season.

Treatment	**2016/2017 Season**												
	Leaves fresh weigh /plant(g)			**Dry leaves weight / plant(g)**			**Leaves fresh weight yield t /cut / fed**			**Dry leaves yield t /cut/ fed**			**Total leaves yield ton/year**
	Cut1	**Cut2**	**Cut3**	**Cut1**	**Cut2**	**Cut3**	**Cut1**	**Cut2**	**Cut3**	**Cut1**	**Cut2**	**Cut3**	
N1	131.4	23.71	75.4	3 7.5	6.84	18.5	3.971	0.713	2.33	1.854	0.432	0.637	2.651
N2	177.3	29.73	93.0	50.98	8.22	28.1	5.385	0.889	2.79	1.900	0.629	0.911	3.088
N3	254.3	46.85	134.3	70.64	12.78	29.5	7.752	1.407	3.93	2.518	0.814	1.118	4.025
Mean	187.6	33.43	101.0	52.99	9.28	25.4	5.702	1.003	3.02	2.091	0.625	0.889	3.255
L s d 0.05	11.37	5.77	11.45	3.79	1.18	2.95	0.481	0.167	0.776	0.132	0.032	0.139	0.2538

N1: 20 kg N fed/cut., N**2:** 30 kg N fed/cut, N**3**: 40 kg N fed/cut

The highest plant height (cm) values were recorded for the three cuts respectively, in 2015/2016 and 2016/2017season by adding nitrogen rate of 40 kg N /fed/ cut. These results are in agreement with **Maheshwar (2005**). Number of main branches recorded for the three cuts in the first and second season**.** The highest nitrogen rate of 40 kg N fed/cut. gave the highest values of plant fresh weight (g) recorded for all cuts respectively in the first and in the second season. The maximum values of plant dry weight (g) recorded for the three cuts respectively in 2015/2016 and 2016/2017season were recorded when nitrogen rate of 40 kg N /fed/ cut was applied. The highest values of leaves fresh weight per plant were obtained under the highest nitrogen rate of 40kg N /fed /cut as compared with the other nitrogen treatments for the three cuts respectively in 2015/2016 and 2016/2017season. Dry leaves weight per plant recorded for the three cuts respectively in 2015/2016 and 2016/2017season were accomplished by adding nitrogen rate of 40 kg N /fed/ cut. Also, the highest nitrogen rate of 40 kg. N /fed/ cut produced the highest values of leaves fresh weight yield (t/fed) recorded for all cuts respectively in 2015/2016 and 2016/2017season in the second season. The current work is in agreement with **Attia (2005)**. The maximum values of dry leaves yield (t /cut/ fed) recorded for the three cuts respectively in 2015/2016 and 2016/2017season after applying nitrogen rate of 40 kg N /fed/ cut. The current work is in agreement with **Allam *et al* 2001** and **Attia (2005)**. The highest nitrogen rate 40 kg. N /fed. produced the highest values of total leaves yield ton/year as compared with the other nitrogen treatments in the first and second seasons**.** On the other hand, the lowest nitrogen rate 20 kg. N/fed cut produced the lowest values of all studied characters in both seasons.

Discussion

Data showed that all stevia characters were significantly affected by nitrogen levels in both seasons.Nitrogen levels from 20to 30 and 40 kg .N/fed/ cut these increases may by attributed to the increase in meristemic activity as well as the production of ouxin which encourage cell elongation .on the other hand , nitrogen deficiency inhabit metabolism and c meristemic activity in plant. These results are in agreement with those obtained by **Allam *et al* 2001 and Attia (2005)**.

Effect of Varieties

Data presented in Table (5, 6,7 and 8) indicate clearly that stevia varieties have significant different in Plant height cm, number of main branches /plant, plant fresh weight (g), dry weight of plant (g), leaves fresh weight per plant (g), dry leaves weight, leaves fresh weight yield t /cut/ fed, dry leaves weight yield t /cut/ fed and total leaves yield ton/year in the first and second seasons. Egy1 varieties gave the highest values surpassing the other varieties except plant height, number of main branches /plant were Spanti varieties gave the highest values for these traits in the first and second seasons.

Egy1 varieties produced the highest values of plant fresh weight (g) in the first and the second season. The current work is in agreement with **Nitu *et al* (2013)** results. The highest values of plant dry weight were produced from Egy1 varieties in the three cuts respectively in the first and second season. Egy1 varieties produced the highest values of leaves fresh weight (g) for all cuts respectively in the first season and second season. These results are in agreement with **Asmaa Haraz (2016)**. The highest values of dry leaves weight (g) were produced from Egy1 varieties for the three cuts respectively in the first and second season**.** The current work results are in agreement with those found by **Asmaa Haraz(2016) and Anami *et al*., (2010)**. Egy1 varieties produced the highest values of fresh weight yield (t /cut/ fed) for the three cuts, respectively in the first and in the second season. These results are in agreement with **Metivier and Viana (1979)**. The highest values of leaves yield (t / cut / fed) were produced from Egy1 varieties for the three cuts respectively in the first season and second season. These results are in agreement with **Brandle and Rosa(1992), Shizhen and Wanzhong (1988)** and **Chalapathi *et al*., (1999).** Egy1 Varieties produced the highest value of total leaves yield (t cut /year) respectively, in the first and second seasons.

Meanwhile, Spanti varieties produced the highest values of plant height for the three cuts respectively in the first and, in the second season. These results are in agreement with **Asmaa Haraz(2016), Anami *et al* (2010), Chalapathi*et al* (1999) and Nitu *et al* (2013)**. Spanti varieties produced the highest values of number of main branches for the three cuts respectively, in the first and second seasons. These results are in agreement with those found by **Anami *et al* (2010) and Nitu *et al* (2013)**

Discussion

Such variation might reflect the efficiency of plant building metabolites or might be ascribed to genetical differences. These results are in agreement with those found by **Asmaa Haraz(2016)** , **Anami*et al* (2010) and Nitu*et al* (2013)**

Table 5. Effect Varieties on plant height, number of main branches per plant, plant fresh weight, plant dry weight of stevia in 2015/2016 season**.**

Treatment	**2015 /2016 Season**											
	Plant height (cm)			**Number of main branches /plant**			**Plant fresh weight (g)**			**Plant dry weigh (g)**		
	Cut1	Cut2	Cut3	Cut1	Cut2	Cut3	Cut1	Cut2	Cut3	Cut1	Cut2	Cut3
V1	58.40	51.2	31.78	10.00	11.67	12.42	350.2	149.5	72.02	103.90	49.39	22.26
V2	58.53	54.3	23.50	11.22	13.17	14.00	387.4	194.1	108.08	106.23	57.11	31.36
V3	74.44	67.2	37.00	14.78	18.78	15.94	174.73	104.0	48.71	57.96	35.50	16.39
V4	52.00	50.4	25.00	8.00	6.33	7.33	208.9	64.6	63.96	60.66	20.24	19.44
Mean	60.84	55.8	29.32	11.00	12.49	12.43	280.3	128.0	73.19	82.19	40.6	22.36
L s d 0.05	4.619	7.10	2.866	1.175	1.178	1.029	18.94	8.49	5.580	5.135	3.055	1.555

V1: China 1 **V2**: Egy1 **V3**: Spanti, **V4:** S **hou** 2

Table 6. Effect Varieties on plant height, number of main branches per plant, plant fresh weight, plant dry weight of stevia in 2016/2017season

Treatment	**2016/2017 Season**											
	Pl**ant height(cm)**			**Number of main branches /plant**			**Plant fresh weight (g)**			**Plant dry weigh (g)**		
	Cut1	Cut2	Cut3	Cut1	Cut2	Cut3	Cut1	Cut2	Cut3	Cut1	Cut2	Cut3
V1	45.73	39.22	42.40	12.94	11.67	15.56	292.8	79.13	165.2	92.54	25.02	45.03
V2	46.44	34.67	40.53	15.06	12.89	16.51	412.7	90.46	214.8	116.92	27.29	52.96
V3	60.61	42.52	47.67	16.99	18.56	22.0	227.1	56.83	146.3	69.57	18.21	41.4
V4	43.61	29.78	35.22	8.33	7.00	11.0	195	45.18	130.3	56.30	13.64	34.31
Mean	49.10	36.55	41.46	13.33	12.53	16.27	281.9	67.90	164.1	83.83	21.04	43.42
L s d 0.05	4.283	2.413	2.782	1.068	1.495	1.871	14.86	3.815	10.03	4.080	1.419	2.493

V1: China 1 , **V2** Egy1: ,**V3**: Spanti , **V4** : Shou2

Table 7. the of effect Varieties on fresh weight per plant, dry leaves weight per plant, leaves fresh weigh yield, dry leaves yield and total leaves yield of stevia in 2015/2016season.

Treatment	2015/2016 Season												
	Leaves fresh weigh / plant (g)			Dry leaves weight/ plant (g)			Leaves fresh yield t/cut/ fed			Leaves yield t /cut / fed			Total leaves yiedt cut /year
	Cut1	Cut2	Cut3	Cut1	Cut2	Cut3	Cut1	Cut2	Cut3	Cut1	Cut2	Cut3	
V1	231.6	65.79	46.38	62.63	19.09	12.94	6.512	1.975	1.396	2.096	0.615	0.644	3.355
V2	244.2	100.2	68.63	63.39	48.29	17.97	7.72	3.011	2.074	2.247	0.894	0.752	3.894
V3	90.0	30.09	21.82	25.51	8.79	6.39	2.69	1.050	0.662	1.102	0.229	0.398	1.729
V4	140.5	27.56	42.52	38.69	7.07	12.09	4.23	1.206	1.279	1.390	0.337	0.59	2.316
Mean	176.6	55.91	44.84	47.56	14.92	12.35	4.615	1.679	1.353	1.709	0.519	0.6	2.824
L s d 0.05	19.38	5.43	5.52	5.491	2.62	1.39	0.482	0.167	0.163	0.331	0.045	0.039	0.3408

V1: China 1 **V2**: Egy1 **V3**: Spanti , **V4** : Shou 2

Table 8. the of effect Varieties on fresh weight per plant, dry leaves weight per plant, leaves fresh weigh yield, dry leaves yield and total leaves yield of stevia in 2016/2017 season.

Treatment	2016/2017 Season												
	Leaves fresh weigh /plant (g)			Dry leaves weight/plant(g)			fresh weigh yield t /cut/ fed			Leaves yield t / cut / fed			Total leaves yiedton/year
	Cut1	Cut2	Cut3	Cut1	Cut2	Cut3	Cut1	Cut2	Cut3	Cut1	Cut2	Cut3	
V1	207.3	37.69	106.1	60.68	10.89	25.20	6.234	1.134	3.18	2.495	0.757	0.892	3.717
V2	284.7	47.79	137.4	77.79	13.13	29.82	8.742	1.431	4.13	2.761	0.753	1.323	4.442
V3	133.4	23.78	71.7	38.41	6.61	18.6	3.714	0.712	2.22	1.578	0.513	0.545	1.889
V4	125.2	24.47	88.0	35.08	6.50	27.9	4.119	0.735	2.55	1.936	0.477	0.796	2.970
Mean	187.6	33.43	101.	52.99	9.28	25.4	5.702	1.003	3.02	2.091	0.625	0.889	3.255
L s d 0.05	12.73	2.673	8.41	3.506	0.893	2.159	0.369	0.078	0.671	0.231	0.044	0.152	0.294

V1: China 1 **V2**: Egy1 **V3**: Spanti , **V4** : Shou 2

Effect of interaction effect between nitrogen fertilizer levels and cultivars

Data in Table (9,10,11and 12) shows that the interaction effect between nitrogen fertilizer levels and stevia varieties that were significant for plant height cm, number of main branches /plant, fresh weight (g), dry weight per plant (g) , leaves fresh weight yield (ton/ fed), leaves yield (ton / fed) and total leaves yield (ton/year). In the first and second seasons, nitrogen fertilizer levels 40 kg N/ fed/cut and egy1 varieties gave the highest values in the three cuts for all studied characters except plant height and number of main branches where nitrogen fertilizer level of 40 kg N/ fed/cut and Spanti varieties gave highest values .

Adding 40 kg N /fed / cut to egy1 varieties recorded the highest values of plant fresh weight (g) for all cuts respectively in the first and the second season. the highest values of plant dry weight (g) were attained by treating Egy1 varieties with nitrogen rate of 40 kg N /fed / cut in all cuts respectively in the first and the second season. Adding 40kg. N /fed / cut to egy1 varieties recorded the highest values of leaves fresh weight / plant(g) for all cuts respectively in the first and the second season. The highest values of dry leaves weight/ plant (g) were obtained by treating Egy1 varieties with nitrogen rate of 40 kg N /fed / cut for all cuts respectively in the first and respectively in the second season . At the same trend, adding 40kg. N /fed / cut to Egy1 varieties recorded the highest values of fresh weight yield (t /cut/ fed) for the three cuts, respectively in the first and second season . The of highest values of leaves yield (t / cut / fed) were obtained by treating Egy1 varieties with nitrogen rate of 40 kg N /fed / cut for all cuts, respectively in the first and second season. The highest values of total leaves yield (t/ cut /year) highest values were obtained by treating Egy1 varieties with nitrogen rate of 40 kg N /fed / cut respectively, in the first and second seasons.

.Mean while, Spanti varieties treated with nitrogen rate of 40 kg N /fed / cut produced the highest values of plant height (cm) of the all cuts in the first and second season. Spanti varieties and nitrogen rate of 40 kg N /fed / cut produced the highest values of number of main branches for the three cuts, respectively in the first and second seasons.

Nitrogen fertilizer level of 20 kg N/ fed/cut added to Shou2 varieties gave the lowest values of plant height, number of main branches, fresh weight of plant(g), dry weight of plant (g), plant height cm, number of main branches, fresh weight of plant(g) and dry weight of plant (g) except plant height in cut 1 in the second seasons. while nitrogen fertilizer level of 20 kg N/ fed/cut and Spanti varieties gave the lowest value of leaves fresh weight per plant (g) , dry leaves weight and total leaves yield (ton/year) while adding 20 kg. N /fed / cut to Shou2 Varieties recorded (cut 2 in the first season and cut 1 and cut 3 in the second season) the lowest values in plant height, respectively. While the lowest values of plant height were recorded when fertilization level of 20 kg .N/ fed /cut was applied to Shou2 varieties in the first and second seasons .respectively.

Table 9. Effect interaction effect between nitrogen fertilizer levels and Varieties on plant height, number of main branches per plant, plant fresh weight, plant dry weight of stevia in 2015/2016 season**.**

treatment	2015/2016 Season											
	Plant height(cm)			numberof main branches /plant			Plant fresh weight (g)			Plant dry weigh (g)		
	Cut1	**Cut2**	**Cut3**	**Cut1**	**Cut2**	**Cut3**	**Cut1**	**Cut2**	**Cut3**	**Cut1**	**Cut2**	**Cut3**
N1V1	54.77	31.3	27.0	9.00	10.67	8.77	219.6	75.0	61.57	67.17	26.30	19.67
N1V2	53.90	32.7	20.67	10.0	12.00	10.0	262.5	103.2	75.67	77.27	34.9	24.72
N1V3	71.50	59.0	32.67	13.67	17.33	14.67	139.9	71.7	32.33	48.17	25.8	11.67
N1V4	46.33	32.0	19.0	6.00	5.00	4.67	155.8	40.1	34.90	46.13	12.8	11.03
N2V1	61.43	53.3	33.0	10.0	11.00	13.83	369.5	169.1	72.80	114.1	58.57	22.80
N2V2	61.67	52.3	24.83	11.00	12.83	16.00	334.0	181.8	97.37	101.3	58.5	30.87
N2V3	71.50	60.0	36.33	14.67	18.33	14.67	166.0	114.4	49.03	53.43	40.1	16.73
N2V4	51.33	55.0	21.0	10.0	5.00	7.33	166.3	66.4	62.63	48.73	22.7	19.53
N3V1	59.00	69.0	35.33	11.0	13.33	14.67	461.4	204.3	81.70	103.90	63.3	24.30
N3V2	61.67	78.0	25.00	12.33	14.67	16.00	565.7	297.2	151.20	140.13	78.0	38.93
N3V3	80.33	82.7	42.00	16.00	20.67	18.33	218.3	125.8	64.77	72.27	40.6	20.77
N3V4	58.33	64.3	35.00	8.00	9.00	10.00	304.5	87.3	94.33	87.1	25.2	27.77
Mean	60.84	55.8	29.32	11.0	12.49	12.43	280.3	128.0	73.19	82.19	40.6	22.36
L s d 0.05	7.507	10.95	4.99	2.185	2.121	2.827	36.70	15.75	12.988	9.049	4.773	4.393

N1: 20 kg N fed/cut., **N2**: 30 kg N fed/cut , **N3**: 40 kg N fed/cut.
V1: China 1 **V2**: Egy1 **V3** : Spanti , **V4** : Shou 2

Table 10. Effect interaction effect between nitrogen fertilizer levels and Varieties on plant height, number of main branches per plant, plant fresh weight, plant dry weight of stevia in 2016/2017 season.

	2016/2017 Season											
	Plant height(cm)			**numberof main branches /plant**			**Plant fresh weight (g)**			**Plant dry weight (g)**		
Treatmeant	**Cut1**	**Cut2**	**Cut3**	**Cut1**	**Cut2**	**Cut3**	**Cut1**	**Cut2**	**Cut3**	**Cut1**	**Cut2**	**Cut3**
N1V1	37.00	40.33	39.67	9.83	10.33	13.67	219.7	63.30	108.2	69.60	20.7	28.17
N1V2	43.4	32.33	35.83	13.83	12.00	16.67	321.3	59.30	179.8	96.07	19.6	45.63
N1V3	53.5	42.33	37.0	15.63	15.67	20.33	196.7	35.83	133.1	50.40	12.4	38.10
N1V4	40.33	23.33	32.0	5.67	5.67	9.67	125.2	31.9	78.2	36.43	10.6	38.10
N2V1	46.00	36.67	41.5	13.67	11.00	15.33	275.5	74.33	164.6	87.13	23.9	22.17
N2V2	50.5	35.00	39.27	15.00	13.00	16.67	404.5	77.7	187.1	117.7	24.6	51.23
N2V3	45.4	28.33	51.33	16.67	17.67	21.0	208.5	58.33	134.7	67.0	18.7	39.47
N2V4	55.67	28.33	33.67	8.67	8.00	11.33	172.8	47.0	110	50.80	13.7	30.1
N3V1	48.50	40.67	46.03	15.33	13.67	17.67	383.1	74.33	222.9	120.90	30.43	55.70
N3V2	50.5	35.00	46.50	16.33	13.67	17.67	512.3	134.4	277.4	137.0	37.7	62.27
N3V3	72.67	44.27	54.67	18.67	22.33	24.67	303.1	76.3	170.9	69.57	23.5	46.63
N3V4	48.5	37.67	40.00	10.67	7.33	12.00	287.0	56.7	202.6	56.30	16.7	50.67
mean	49.10	36.55	41.46	13.33	12.53	16.27	281.9	67.90	164.1	83.83	21.04	43.42
L s d 0.05	7.356	4.962	4.899	1.717	2.701	3.013	28.17	10.582	21.77	7.303	2.783	4.522

N1: 20 kg N fed/cut , **N2**: 30 kg N fed/cut , **N3**: 40 kg N fed/cut. ,
V1: China 1 , **V2**: Egy1 , **V3**: Spanti , **V4** : Shou2

Table 11. Effect interaction effect between nitrogen fertilizer levels and Varieties on fresh weight per plant, dry leaves weight per plant, leaves fresh weigh yield, dry leaves yield and total leaves yield of stevia in 2015/2016 season.

2015/2016 Season

treatmeant	Leaves fresh weigh/plant (g)			Leaves weigh/plant (g)			L eaves fresh weight yield ton/ fed			Leaves yield ton / fed			Total leaves yiedt/ fed/year
	Cut1	Cut2	Cut3	Cut1	Cut2	Cut3	Cut1	Cut2	Cut3	Cut1	Cut2	Cut3	
N1V1	135.6	31.90	41.5	37.57	9.30	12.03	3.965	0.957	1.251	1.373	0.263	0.586	2.222
N1V2	144.3	55.50	50.33	40.67	16.40	14.93	4.433	1.668	1.513	1.7	0.690	0.619	3.009
N1V3	68.9	28.53	12.0	20.17	8.57	3.77	2.065	0.635	0.367	0.932.	0.172	0.242	1.346
N1V4	95.2	20.00	19.57	26.90	5.20	5.53	2.855	0.821	0.591	0.996	0.303	0.474	1.773
N2V1	237.7	73.47	45.83	67.43	21.00	13.33	5.900	2.207	1.377	2.314	0.588	0.479	3.380
N2V2	237.7	76.13	61.03	62.10	18.90	17.83	7.430	2.288	1.837	2.262	0.830	0.756	3.848
N2V3	85.4	26.73	21.93	22.77	7.90	6.30	2.536	0.670	0.667	0.837	0.221	0.383	1.443
N2V4	116.7	22.67	44.33	31.17	6.10	12.7	3.507	0.812	1.337	1.373	0.366	0.587	2.302
N3V1	321.7	92.00	51.80	82.90	26.97	13.47	9.673	2.763	1.560	2.601	0.995	0.867	4.463
N3V2	381.8	169.0	94.53	87.40	38.97	21.13	11.313	5.077	2.873	2.78	1.163	0.881	4.824
N3V3	115.6	35.00	31.53	33.60	9.90	9.10	3.470	0.670	0.952	1.537	0.296	0.566	2.399
N3V4	209.7	40.00	63.67	58.00	9.90	18.03	6.327	0.812	1.910	1.799	0.366	0.71	2.875
mean	176.6	55.91	44.84	47.56	14.92	12.35	4.615	1.679	1.353	1.709	0.519	0.6	2.824
L s d 0.05	34.83	9.59	10.02	8.663	4.0	2.79	0.8893	0.294	0.299	0.519	0.071	0.079	0.542

N1: 20 kg N fed/cut., **N2**: 30 kg N fed/cut , **N3**: 40 kg N fed/cut.
V1: China 1 **V2**: Egy1 **V3**: Spanti , **V4** : Shou2

Table 12. Effect interaction effect between nitrogen fertilizer levels and Varieties on fresh weight per plant, dry leaves weight per plant, leaves fresh weigh yield, dry leaves yield and total leaves yield of stevia in 2016/2017 season.

treatmeant	2016/2017 Season												
	Leaves freshweigh/plant (g)			dry leaves weight/plant (g)			Leaves fresh yield ton cut/ fed			Leaves yield ton cut / fed			Total leaves yiedt/ fed/year
	Cut1	Cut2	Cut3	Cut1	Cut2	Cut3	Cut1	Cut2	Cut3	Cut1	Cut2	Cut3	
N1V1	140.8	29.0	61.4	40.67	8.50	12.03	4.230	0.873	1.84	2.077	0.541	0.453	2.701
N1V2	207.3	31.63	120.2	59.33	8.90	27.93	6.270	0.956	3.61	2.497	0.535	0.975	3.693
N1V3	97.4	16.33	46.83	27.63	4.80	12.0	2.487	0.488	1.77	0.831	0.299	0.407	1.351
N1V4	80.0	17.87	73.33	21.77	5.17	22.2	2.896	0.533	2.09	2.013	0.353	0.408	2.860
N2V1	193.1	35.33	111.2	58.03	10.07	31.13	5.803	1.057	3.34	2.324	0.781	1.053	3.735
N2V2	286.3	36.4	114.0	79.50	10.20	28.5	8.767	1.085	3.42	2.438	0.729	1.367	3.693
N2V3	118.3	22.67	80.4	34.57	6.03	21.6	3.367	0.677	2.15	1.104	0.569	0.480	1.351
N2V4	111.3	24.53	66.6	31.80	6.60	13.1	3.367	0.739	2.26	1.733	0.439	0.746	2.698
N3V1	288.1	48.73	144.6	83.33	14.10	32.4	8.670	1.473	4.35	3.085	0.949	1.170	4.716
N3V2	360.4	75.33	177.9	94.53	20.30	33.03	11.19	2.253	5.35	3.349	0.995	1.627	5.477
N3V3	184.3	32.33	88.0	53.03	9.00	22.33	5.290	0.970	2.75	1.578	0.671	0.747	2.552
N3V4	184.3	31.00	126.7	7.73	31.67	30.3	5.857	0.933	3.28	2.061	0.639	0.930	3.353
mean	187.6	33.43	101.	52.99	9.28	25.4	5.702	1.003	3.02	2.091	0.625	0.889	3.255
L s d 0.05	20.68	6.164	15.22	5.918	1.600	3.913	0.658	0.179	1.153	0.357	0.0695	0.248	0.4751

N1: 20 kg N fed/cut., **N2**: 30 kg N fed/cut , **N3**: 40 kg N fed/cut.
V1: China 1 **V2**: Egy1 **V3**: Spanti , **V4** : Shou2

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التقيم النباتي لبعض أصناف الاستيفيا تحت مستويات مختلفة من التسميد الازوتي

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اجريت الدراسة في محطة بحوث الجيزة مركز البحوث الزراعية موسمي 2015- 2016 و2016-2017 لدراسة تاثير التسميد النتروجينى (20 ، 30و40 كجم نتروجين/ فدان / حشة) وبعض الاصناف (Egy 1،china 1 spantil .2 shou) وتفاعلهما علي الصفات تحت الدراسه في الموسمين.

* اعطت معدلات التسميد الازوتي اختلافات عاليه المعنويه لجميع الصفات تحت الدراسة عند مستوي معنويه 5 % اعطي معدل تسميد 40 كجم نتروجين/ فدان / حشة اعلي القيم لجميع الصفات مقارنة بالمعاملات الاخري في الموسمين .

*أوضحت النتائج وجود فرق معنوية كبيرية بين جميع الاصناف لجميع صفات النمو والمحصول عند مستوي معنويه 5 % وسجل الصنف 1 Egy اعلي القيم لجميع الصفات ماعد طول النبات وعدد الافرع في الموسمين مقارنه بالاصناف الاخري .

*أوضحت النتائج أيضا ان التفاعل بين اضافة معدل40 كجم نتروجين/ فدان / حشة والصنف Egy1 اعطى االتفاعل بينما اضافة معدل 40 كجم نتروجين للحشة والصنف Egy 1 اعلي القيم لجميع الصفات ماعد طول النبات وعدد الافرع في الموسمين .