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INFLUENCE OF USE NITROGEN FERTILIZER LEVELS AND SOURCES FOR LATE SOWING DATE ON YIELD AND QUALITY OF SUGAR BEET (*Beta vulgaris L.*) IN NORTH NILE DELTA.

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ABSTRACT

Two field experiments were conduct at Sakha Agric Res. Station , Kafr El-Sheikh Governorate during 2008/2009 and 2009/2010 seasons. The objectives of this study aimed to study effect of three nitrogen levels (75 , 90 and 105 kg N /fad) and two nitrogen sources (ammonia gas 82 % and urea 46 % N) on yield and quality of sugar beet under environmental conditions of Nile Delta region . The main findings could be summarized as follows:

Application of nitrogen fertilization at the rate of 105 kg N / fad in the form of ammonia gas by 6 days before sowing gave the highest values of chastises i.e root, sugar and top yields as well as top/root ratio, Na, K ,α-amino nitrogen content and sugar loss in molasses in both seasons .On the contrary , sucrose , purity , sugar extractable , extractability percentages and alkaline coefficient recorded the lowest values in both seasons. Application of ammonia as a source of N significantly increased, root and sugar yields, sucrose and purity % as well as sugar extractable and extractability % and alkaline coefficient .

Generally, it could be concluded that application of ammonia gas at 6 days before sowing for late sowing at the end of October gave the highest root yield and quality for sugar beet compared that fertilized by urea which applied late after sowing as another nitrogen source.

INTRODUCTION

Sugar is considered a strategic commodity for many countries of the world. Sugar beet in Egypt introduced as anew sugar crop and take descending order after sugar cane. Aims of all investigators was to decrease the gape between production. and consumption by increasing sugar production

Many investigations pointed out that sowing date play one of the most important factors affecting root yield and its attributes as well as quality of sugar beet. In Egypt, sowing date for sugar beet ranged through three months, sowing during last month (end of October) meet some problems as, low growth rate, low temperature, high weed competition and decrease in sugar content. This investigation was carried out to study influence of injection ammonia gas to fertilize sugar beet at early time in life cycle of plant to gave it a good chance to solve mentioned problems compare with solid fertilizer as urea which applied at two equal doses the first after four true leaves and the other after one month later which can't solve the problems until now.

Injectio ammonia give a good chance for early absorption of N after germination than urea Srivastave and Singh (1981) in India, reported that sowing date at 5th Oct. gave significantly higher root and sugar yields as well as root sugar content than sowing on 20th Oct. Or 20th Nov. Hanna *et al*. (1988) and El-kassaby and Leilah (1992) and Ahmed (2003) in Egypt, concluded that sowing during Oct. markedly increased root diameters , root weight , sugar content as well as root and sugar yields than sowing during Nov. Dubich *et al* (1973) pointed out that injection of ammonia gas or urea at depth 12-15 cm at levels 50 kg / ha gave the highest root and sugar yields . Mostafa , Shafika and Darwish (2001) concluded that injection ammonia at level (102kg /fad) gave the highest root yield sugar and top yields /fad Atia *et.al* (2007) compared ammonia gas with urea and found that ammonia progressed than urea for root yield. Alaa *et al*. (2009) and Zalat *et al*. (2011) reported that ammonia injected or urea at level 90 kg /fad gave the highest root and sugar yields at planting date in mid August (early sowing date). The objective of this study was aimed to determine the influence of ammonia injection and urea fertilizer levels on yield and quality of sugar beet at late sowing date under Kafe EL- Sheikh environmental conditions.

MATERIALS AND METHODS

Two field experiments were carried out during the two successive soasons of 2008/2009 and 2009/2010 at farm of Sakha Agric Res Station in Kafr EL-Sheikh Governorate at north Nile Delta Region . The aims of this study was to find out the influence of injection ammonia gas (82%N) and urea (46%N) fertilizer on yield and quality of sugar beet planted at late sowing date at levels of 75, 90 and 105 kg N / fad for every one. Chemical analysis of experimental soil sites in Table (1). Treatments were distributed in split-plot design with three replications, the main plots included three nitrogen levels for every N source ammonia gas or urea (75, 90 and 105 kg N /fad) . Meanwhile, nitrogen sources were allocated in sub – plots. (Injection ammonia and applied urea). Sugar beet cultivar (Gazelle) was planted in both soasons in ridges 50 cm. apart and 20 cm between hills in long 15m. Each plot contained 6 rows, 15 m – long plot area was ($45m^2$). Phosphorus ($15.5\%P_2O_5$) and K ($48\%K_2O$) were used at 100 kg /fad for every one as used in sugar beet field .

Table (1): Soil mechanical and chemical properties of the experimental site in the two seasons.

Soil properties										Available nutrients (ppm)					
Seasons	Coarse sand %	Fine sand %	Silty %	Clay %	Textural class	Ca CO_3%	E.C.(1:5 dSm^{-1})	pH	Organic matter %	N	P	K	Fe	Zn	Mn
2008/09	5.24	14.2	31.8	45.0	Silty clay	3.14	2.81	7.7	1.86	27.5	8.50	415	938	7.45	12.1
2009/10	4.92	15.1	30.0	46.3		2.60	3.13	8.17	1.80	28.2	8.95	387	11.5	6.23	13.3

Sowing date was during the last and first week of Oct. and Nov. in both seasons, respectively. The other cultural practices were carried out as recommended. From sub – plots ten roots were taken at random from two guarded rows to determined yield and juice quality characteristics using an all parameters were determined in Delta Sugar Company Limited Laboratories at El-Hamoul, Kafr El-Sheikh Governorate according to the method of McGinnus (1971).

The average soil mechanical and chemical properties of the experimental site were determined according to Black (1965) and are given in Table (1).

Juice quality characteristics were determined in the fresh roots using an automatic French system (HYCEL) as follows :

1. Sucrose percentage (pol%) was determined using polarimeter on a lead acetate extract of fresh macerate root according to the method of Le-Doct (1927).
2. Potassium and sodium percentages were determined using flame photometer and α-amino-N was determined using ninhydrin and hydrindantin method according to Carruthers *et al*. (1962).
3. Purity % was calculated according to the following formulas:

Purity % = 99.36 – [14.27 (V1 + V2 + V3)/V4] (Devillers, 1988).

Where V_1 = Sodium % V_2 = Potassium %

V_3 = α-amino % V_4 = Sucrose % (Pol %)

4. Sugar loss to molasses (SM), sugar extractable and extractability% were calculated according to the following formulas :

Sugar loss to molasses = $(V_1 + V_2)\ 0.14 + V_3 \times 0.25 + 0.5$,(Deviller 1988).

5. Extractable sugar % = V4 – SM-0.6, (Dexter *et al*. 1967).
6. Extractability % = extractable sugar/sucrose %.
7. Root, sugar and top yields were determined as follows:

Root and top yields (t/fad.) was determined from the two inner ridges basis.

Sugar yield (t/fad.) was calculated according to the following equation. (Root yield × sucrose % × Purity %)

8. Alkaline coefficient = $\dfrac{V_1 + V_2}{V_3}$

The analysis of variance was carried out according to Gomez and Gomez (1984). Treatment means were compared using Duncan's multiple rang test (Duncan, 1955). All statistical analysis were performed using analysis of variance technique by means of (M. STAT) computer software package.

RESULTS AND DISCUSSION

Root, sugar and top yields in (tons/fad)

The results in Table 2 clearly showed that root yield significantly increased with increasing N fertilizer levels from 75 to 105 kg N/fad from ammonia 22. 56 to 30.52 and 25.60 to 30.36 ton /fad in both seasons respectively. Similar results were found by Ramadan (2005) who concluded that application N fertilizer at a reat of 105 kg N /fad gave the highest root yield /fad. Similar conclusion was reported by Abd El-Aal *et al*. (2007), Sedah (2008) and Zalat *et al*. (2011). found that applied N (150 kg ammonia) produced the highest values of root yield / fad.

Table (2): Means of root, sugar and top yields in (tons/fad) as affected by nitrogen fertilizer levels and nitrogen sources for late sowing date and their interaction during 2008/2009 and 2009 /2010 seasons.

Nitrogen levels (L)	Root yield		Sugar yield		Top yield	
	N. sources (s)					
	First season					
	Ammonia	Urea	Ammonia	Urea	Ammonia	Urea
75kg N /fad	22.56	20.36	3.48	2.97	2.52	4.53
90kg N/ fad	27.16	23.92	4.03	3.40	3.45	6.49
105kg N/ fad	30.52	26.90	4.25	3.46	4.90	7.39
LSD5%(L)	0.24		0.09		0.43	
LSD5%(S)	0.14		0.14		0.28	
L X S	0.23		n.s		0.05	
Second season						
75kg N /fad	25.60	19.17	3.27	2.92	3.12	5.01
90kg N/ fad	28.74	22.65	3.93	3.22	4.92	6.89
105kg N / fad	30.36	24.10	4.24	3.16	5.87	7.95
LSD5%(L)	2.18		0.05		0.22	
LSD5%(S)	0.71		0.05		0.16	
L X S	1.23		0.90		n.s	

Injected ammonia at level 105 kg N /fad gave the highest root yield 30.52 and 30.36 ton/fad in both season compared with using urea fertilizer at the same level 26.90 and 24.10 ton/fad in both seasons, respectively. The progress of ammonia at high levels than urea due to injection ammonia pre sowing gave a good chance to N to become available to plants from the first day after emergency consequently produced maximum growth rate and then root yield. Similar results were obtained by Dubich *et. al*. (1973) and Benjamin *et. al* (1994). Results clearly inducted that significant interaction effects were found between nitrogen fertilizer level and its sources in both season. Maximum root yield 30.52 and 30.36 ton /fad. In both seasons were obtained with using ammonia gas at level 105 kg N / fad compared with urea at the same level, respectively.

The results in Table 2 clearly showed that sugar yield was appreciably in- fluenced by nitrogen fertilizer levels in both seasons. Raising N levels to 90 and 105 kg N / fad. due to increased sugar yield by o.55 and o.77 ton / fad in the first season and by o.66 and o.97 ton /fad in the second season. These results are probably due to increases in root yield as mentioned before. These results are in good harmony with those obtained by Abd EL Kader (2005), Azzazy (2006), Sedah (2008) and Zalat *et al*. (2011).

The results in Table 2 clearly Indicated that a significant differences were observed between sugar yield in both season as affected of nitrogen sources. Ammonia Injection before planting resulted increases in sugar yield / fad in both seasons compared with application of urea after planting. These results are attributed to increases in root yield / fad due to increases in N available by ammonia injection from the first day after emergence to the optimum period for growth and sugar accumulation. These results in good agreement with those reported by Mostafa, Shafika and Darwish (2001) , Stevens *et al*. (2007), Alaa *et al*. (2009) and Zalat *et al*. (2011).They conducted that the results clearly showed that a significant interaction effect was found in the second season between N levels and N sources. Maximum sugar yield 4.25 ton produced from ammonia injection at level 105 kg N /fad compare with urea at the same level.

Results in Table 2 pointed out a significant increase in top yield in both seasons was found due to nitrogen fertilizer levels. Application nitrogen fertilizer level at 105 kg N /fad significantly increased top yield / fad for and N sources compared with other two levels, 75 and 90kg / fad. Increases N top yield /root may be attributed to increases in N levels leading to encourage vegetative growth and increased top yield. EL-Keredy *et al*. (2008) found that increasing N levels due to increase in top yield (ton / fad).

Application of urea surpassed injection of ammonia and gave maximum top yield (7.39 and 7.95 ton / fad compare with ammonia which recorded the lowest ones (4.90 and 5.87 ton / fad). In the first and the second seasons respectively.

The late application of urea enhanced vegetative growth until near the end of season, in contrary of ammonia which depletion from the soil early than urea. These results are in line with those obtained by Mostafa, Shafika and Darwish (2001), Alaa *et al*. (2009) and Zalat *et al*. (2011).

The results clearly showed a significant interaction between nitrogen fertilizer levels and nitrogen sources was found in the first season only. Maximum top yield /fad was found (7.39 t/fad).Due two application of urea fertilizer at 105 kg N / fad.

Impurities (Na, k and α- amino N) contents in sugar beet root.

Results Presented in Table 3 showed that root contents from sodium (Na), potassium (k) and alpha amino nitrogen (α- amino N) were significantly increased with increasing N fertilizer levels from 75 to 105 kg N / fad in both seasons. These results In good accordance with those obtained by Mostafa, Shafika and Darwish (2001) , Sedah (2008) and Zalat *et al*. (2011). who concluded that increasing N application was accompanied with increasing in root impurities contents.

In addition, a significant difference were found due to nitrogen source using urea fertilizer exhibited progressive than ammonia as a nitrogen source gave maximum values for all studied impurities. These results are in good agreement with those obtained by Alaa *et al*. (2009) and Zalat *et al*. (2011).

Sucrose, purity percentages and top / root ratio.

The results presented in Table 4 clearly showed a significant reduction in sucrose percentage due to increasing of nitrogen fertilized rate from 75 to 105 kg N / fad in both seasons. Increasing N fertilizer application resulted in increases in water content in roots causing reduction in sucrose as a percentage of root fresh weight (Draycott 1993). These results are confirmed by Sedah (2008) and EL-Keredy *et al*. (2008).

Table (3): Means of impurities contents i.e. Na, k and α- amino nitrogen as affected by nitrogen fertilizer levels and nitrogen sources for late sowing date and their interaction during 2008/2009 and 2009 /2010 seasons.

Nitrogen levels (L)	Na %		K %		α- amino N %	
	N . sources (s)					
	First season					
	Ammonia	Urea	Ammonia	Urea	Ammonia	Urea
75kg N /fad	2.14	2.18	5.05	5.19	1.91	2.00
90kg N/ fad	2.22	2.38	5.54	5.82	2.94	3.11
105kg N/ fad	2.25	3.00	5.84	6.01	3.09	3.65
LSD5%(L)	0.06		0.06		0.24	
LSD5%(S)	0.07		0.04		0.13	
L X S	0.12		0.06		0.23	
Second season						
75kg N /fad	2.31	2.39	5.59	5.67	2.00	3.32
90kg N/ fad	2.43	2.72	6.01	6.89	3.01	3.49
105kg N/ fad	2.81	3.47	6.52	6.95	3.51	3.89
LSD5%(L)	0.19		0.10		0.09	
LSD5%(S)	0.14		0.06		0.09	
L X S	0.24		0.10		n.s	

Injection ammonia produced lowest sucrose content (15.61 and 16.70%) when applied at 105 kg N / fad compared with urea which gave(14.76 and 15.26%) in the first and the second seasons respectively In spite of root yield / fad produced highest sucrose with using ammonia compared with urea, the results indicated lowest sucrose percentage with using studied ammonia this due to depletion of N early which controlled top growth and increased sucrose % than urea which not depleted early and encouraged top growth and decreased sucrose %. These results in good agreement with that found by Alaa *et al*. (2009) and Zalat *et al*. (2011). No significant interaction effects was found between the two studied factors in both seasons.

Results in Table 4 showed that purity percentage significantly decreased with increasing nitrogen fertilizer levels up to 105 kg N / fad in both seasons. Increasing nitrogen fertilizer significantly decreased purity percentages (Abd EL-Aal *et al*. 2007) .

Results showed that injected ammonia caused a significant increases in purity% (89.14 and 88.39%) In the first and the second seasons respectively. Compared with urea which gave lowest one (87.12 and 85.98%) in both seasons, resp. This trend related with sucrose % also, significant interaction effect was found in the second season resulted from N levels and N sources and recorded maximum purity % (91.33%) with ammonia gas interaction at level of 75 kg N / fad.

Raising N application from Urea 75 to 105 kg N / fad caused significant increase in top / root ratio in both seasons and recorded the highest ratio (27.47and 32.99) In the first and the second seasons respectively. The opposite trend was found with urea application compared with injection ammonia application which recorded lowest one in both seasons .

Table (4): Sucrose and purity percentages as well as top/root ratio as affected by nitrogen fertilizer levels and nitrogen sources for late sowing date and their interaction during 2008 / 2009 and 2009 /2010 seasons.

Nitrogen levels (L)	Sucrose %		Purity %		Top /root ratio	
	N. sources (s)					
	First season					
	Ammonia	Urea	Ammonia	Urea	Ammonia	Urea
75kg N /fad	16.84	16.02	91.65	91.01	11.17	22.25
90kg N/ fad	16.48	15.93	90.09	89.23	12.70	27.13
105kg N/ fad	15.61	14.76	89.14	87.12	16.06	27.47
LSD5%(L)	0.56		1.63		0.66	
LSD5%(S)	0.40		0.87		0.42	
L X S	n.s		n.s		0.73	
Second season						
75kg N /fad	17.60	16.82	91.33	90.55	15.32	26.13
90kg N/ fad	17.11	16.21	89.82	87.83	19.22	30.42
105kg N/ fad	16.70	15.26	88.39	85.98	20.42	32.99
LSD5%(L)	0.42		1.06		0.55	
LSD5%(S)	0.26		0.31		0.41	
L X S	n.s		0.53		0.71	

It can be noticed that urea progressed than ammonia in this trait because urea applied at late time compared with ammonia which injected at early time which caused to continuous vegetative growth for more time and gave huge top yield than root yield . Significant interaction effects were found in both seasons, the results from the interaction between N levels using (105 kg N/ fad) and N source , (urea) produced maximum top /root ratio (27.47 and 32.99) In the first and the second seasons, respectively.

Sugar losses in molasses and sugar extractable percentages.

The results furnished in Table 5 clear that increasing nitrogen levels from 75 to 105 kg N / fad. Significant increase in sugar losses was found in both seasons. This increase due to increase in purities which accompanied with reduction in sucrose and increasing sugar losses. These results are in harmony with those reported by Ramadan (2005),Ferweez *et al*. (2006) , EL – Keredy *et al*. (2008 and Zalat *et al*. (2011).

Table (5): Means of sugar loss in molasses and sugar extractable percentages as affected by nitrogen fertilizer levels and nitrogen sources for late sowing date and their interaction during 2008/2009 and 2009 /2010 seasons.

Nitrogen levels (L)	Sugar loss in molasses%		Sugar extractable%		Sugar loss in molasses%		Sugar extractable%	
	N. sources (s)				N. sources (s)			
	Ammonia	Urea	Ammonia	Urea	Ammonia	Urea	Ammonia	Urea
	First season				Second season			
75kg N /fad	2.05	2.08	14.19	13.34	2.18	2.23	14.82	13.99
90kg N/ fad	2.15	2.25	13.73	13.08	2.29	2.53	14.22	13.08
105kg N/ fad	2.19	2.51	12.82	11.65	2.51	2.83	13.59	11.83
LSD5%(L)	0.04		1.32		0.08		0.37	
LSD5%(S)	0.03		0.92		0.09		0.49	
L X S	0.05		n.s		n.s		0.85	

The analysis of variance in both seasons pointed out that application of urea caused to significant differences between percentages of sugar loss and gave maximum losses percentages in molasses (2.51 and 2.83 %) In the first and the second seasons, respectively compared with ammonia which recorded the lowest percentages (2.19 and 2.51 %) In the first and the second seasons, respectively. This du to effect of urea on growth and increasing impurities which related to increase in sugar losses on the contrary. Alaa *et al*. (2009) and Zalat *et al*. (2011). found that injection ammonia and urea failed to give significant differences between percentages of sugar losses in molasses in both seasons . No significant differences were observed due to interaction between nitrogen fertilizer levels and nitrogen sources on sugar loss in molasses in both seasons.

Results presented in Table 5 clearly showed that nitrogen levels significantly affected sugar extractable percentages in both seasons. Application of high levels of nitrogen (105 kg N / fad) caused to lowest sugar extractable percentages (12.82 and 13.59 %) compared with low nitrogen fertilizer levels (14.19 and 14.82 %) in both seasons. Similar findings were observed by Prosba *et al.* (2001), EL – Keredy *et al*. (2008) and Zalat *et al*. (2011).

A Significant reduction in sugar extractable percentages associated with urea application in both seasons and gave the lowest sugar extractable percentages (11.65 and 11.83 %) compare with addition of ammonia gas (12.82 and 13.59 %)with application of (105 kg N / fad).The same trend was found with application of (75 kg N / fad) and ammonia recorded the highest percentages of extractable sugar as shown in Table 5 .

Significant interaction was found between nitrogen fertilizer levels and nitrogen sources on percentages of sugar extractable in the second season only and maximum percentages (14.82 %) produced from using nitrogen fertilizer ammonia gas injection at level of 75 kg N / fad compared with the lowest percentages (11.83 %) produced when urea was added at level (105 kg N / fed).

Extractability percentages and alkaline coefficient value.

Concerning the effect of nitrogen fertilizer levels on extractability percentages, results presented in Table 6 showed that high levels of N fertilization (105 kg N / fad) gave the lowest extractability percentage (82.13 and 78.93 %) and (81.38 and 77. 52 %) In the first and the second seasons, respectively.

Increasing nitrogen prevent of sugar extraction and decrease sugar extractability %.In respect to nitrogen sources effect on extractability percentages, results in Table 6 pointed out that ammonia gas exhibited significantly increased extractability percentages than urea because ammonia limited vegetative growth early than urea and decrease impurities characters. The highest N fertilizer levels recorded the lowest extractability percentages (82.13 and 81.38 %) compared with urea application which recorded the lowest percentages (78.93 and 77.52 %) In the first and the second seasons, respectively. These results are natural because nitrogen element due to significant decrease in crystallization of sucrose due to reduction in sugar extractable and extractability percentages.

The interaction between N fertilizer levels and N sources significantly affected extractability percentages in the second season only. Application of 75 kg N/fad from ammonia gas produced the highest percentages (84.20 %) compared with application (105 kg N/fad) which produced the lowest percentages (81.38 %).

The results in Table 6 clearly showed that alkaline coefficient significantly decreased with increasing N levels. This coefficient consider the reflection mirror for suitable dose for N which must be applied and its value must be above 1.8 and the values less than 1.8 indicate that over fertilization was happened. All values were obtained in more than 1.8, this means that all nitrogen fertilizer levels of (75, 90 and 105 kg N / fad) were suitable dose for sugar beet. (Weininger and Kubadinow (1971) and Pollach (1984) and (1989).

Table 6: Extractability percentages and alkaline coefficient value as affected by nitrogen fertilizer levels and nitrogen sources for late sowing date and their interaction during 2008/2009 and 2009 /2010 seasons.

Nitrogen levels (L)	Extractability %		alkaline coefficient value		Extractability %		alkaline coefficient value	
	N. sources (s)				N. sources (s)			
	Ammonia	Urea	Ammonia	Urea	Ammonia	Urea	Ammonia	Urea
	First season				Second season			
75kg N /fad	84.26	83.27	3.76	3.69	84.20	83.17	3.95	3.47
90kg N/ fad	83.31	82.11	2.64	2.64	83.10	80.69	2.80	2.75
105kg N/ fad	82.13	78.93	2.62	2.47	81.38	77.52	2.66	2.68
LSD5%(L)	0.34		0.08		0.21		0.17	
LSD5%(S)	0.78		0.03		0.18		0.10	
L X S	n.s		0.05		0.30		0.17	

The results indicated that significant differences were observed between alkaline coefficient values in both seasons. The results in Table 6 showed that ammonia gas injection progressive than urea and gave the highest values. These results may be attributed to ammonia injected early and depleted for nitrogen early on the opposite of urea which produced huge photosynthetic and huge alpha amino nitrogen which caused to decreased alkaline coefficient value.

The results indicated that significant interaction effects were found between N fertilizer levels and N sources on alkaline coefficient. The highest values were (3.76 and 3.95) In the first and the second seasons, respectively. resulted from applied N fertilizer levels 75 Kg N / fad from ammonia gas as N sources. Generally it could be concluded that for late sowing date for sugar beet under environmental conditions of north Nile Delta we must fertilize sugar beet by injection ammonia at level 105 Kg N /fad to avoid bad conditions of this period and take good yield and quality than fertilization with urea.

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تـأثير أسـتخدام معـدلات ومصـادر السـماد النيتروجينـى لمواعيـد الزراعـة المتـأخرة علـي محصول وجودة بنجر السكر.

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أقيمـت تجربتـان حقليتـان خـلال الموسـيمين الـزراعيين2008/ 2009و 2010/2009وذلـك بالمزرعة البحثية لمحطة البحوث الزراعية بمحافظة كفرالشيخ تهدف هذه الدراسة إلى تـأثير استخدام ثلاث معدلات من السماد النيتروجينى (75، 90، 105 كجم ن / ف) لمصـدرين من مصـادر النيتروجينـى وهي (أمونيـا غازيـة 82%نيتـروجين و اليوريـا 46% ن) واثرهـا علـي المحصـول وجـودة العصـير لمحصـول بنجرالسكر لمواعيد الزراعـة المتـأخرة والتـي تقابلهـا ظـروف غيرطبيعيـة وصـعبة تحـد مـن صـفات الجـودة والمحصول لهذة المواعيد . لذا وجب القيام بمزيد من البحوث لتقليل وتفادي التـأثيرات الضـارة حتي تحصل علي اكبر محصول ذو مواصفات جودة عالية وقد استخدم تصميم القطع المنشقة مرةواحدة في ثلاث مكررات حيث وزعت معدلات السماد النيتروجينى الثلاثة في القطـع الرئيسية وأما مصدري السماد النيتروجينى فقد وزعت في القطع المنشقة الاولي .وتم زراعة التجربة بالصنف التجاري (Gazelle) في الاسبوع الاخير والاول من شهري أكتوبر ونوفمبر علي التوالي.

وتشير النتائج المتحصل عليها :

1 - أن إضافة السماد النيتروجينى بمعدل (105 كجم ن / ف) قد ادي الـي زيـادة قيم الصـفات التاليـة تحت الدراسـة وهـى محصـول الجـذور و نسبة كـلا مـن الصـوديوم و البوتاسـيوم والالفـا امينـو نيتـروجين فـي الجـذور و محصـول الجـذور و السـكر و العـرش بـالطن/ف وكذلك نسبة العرش/ الجذر ونسبة كـلا مـن الصـوديوم والبوتاسيو والالفا امينونيتروجين في الجذور وأيضا زيادة نسبة السكر المفقود في المولاس

2- وعلي الجانب الاخر ادت هذة الزيادة في التسميد النيتروجينى إلي نقص في نسبة كلا من السكروز والنقاوة والسكر المستخلص و نسبة الاستخلاص ومعامل القلوية في كلا الموسمين. وأما مصـادر السماد النيتروجينـى فقد أدي حقن الامونيـا الغازيـة الـي التفـوق علـي سـماد اليوريـا فـي اعطـاء اكبـر محصـول للجذور ومحصول السكر ونسبة السكروز في العصير والنقاوة والسكر المستخلص ونسبة الاستخلاص ومعامل القلوية وذلك في كلا الموسمين.

3 – أشـارات النتـائج أن كـان هنـاك تـأثيرا معنويـا للتفاعـل بـين معـدلات السـماد النيتروجينـى والمصـدرين المستخدمين علي معظم الصفات التي كانت تحت الدراسة في كلا الموسمين ماعدا صفة محصول السكر ونسبة النقاوة والسكر المستخلص و نسبة الاستخلاص في المواسم الاول غير معنوي وكان التفاعل غير معنوي أيضـا فـي الموسم الثـاني للصـفات محصـول العـرش و الفـا امينـو نيتـروجين والسـكر المفقـود فـي المولاس.

وعمومـا يمكن الوصـول مـن هـذة النتـائج أن إضـافة الامونيـا الغازيـة فـي صـورة حقن قبـل الزراعـة بمعدل 105 كجم ن / ف هي الافضل لتسميد بنجر السكر وخاصـة لمواعيد الزراعـة المتـأخرة أذا مـا قورنـت باضافة اليوريا التي تضاف علي دفعتين الاولي بعد الخف و الثانية بعد شـهر مـن الاولـي تحت ظـروف منطقـة شمال الدلتا. حيث أن الأمونيا تساعد النباتات علي تحمل الظروف الصعبة لمواعيد الزراعة المتأخرة.

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