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EVALUATION OF INJECTED AMMONIA AND COMPOST TEA SPRAYING ON PRODUCTIVITY OF SUGAR BEET

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ABSTRACT: ***Two field experiments were carried out during the two growing seasons 2007/2008 and 2008/2009 at the experimental farm of Sakha Agricultural Research Station, North Nile Delta Region, Agricultural Research Center, Egypt. A study was conduced to evaluate the effect of preplant N placement strategist and compost tea extract as a foliar spraying on yield and quality of sugar beet. Nitrogen was applied in the two forms. The first form was urea (46.5%N) at the rate of 90 Kg N/fed as control. The second form was ammonia gas injection before one week from planting date at rates of 80, 90 and 100 kg/fed. Compost tea extract was used 0, 1, 2 and 3foliar sprays.***

Plants received nitrogen with the recommended rate (90 kg N/feddan) in the form of urea or ammonia produced the highest top, root and sugar yields per feddan in both seasons. The concentration of total sugar, extraction of white sugar and juice purity were increased significantly by injection soil with ammonia gas up to the rate of 90 kg N/feddan compared with control (application of urea at the rate of 90 kg N/feddan) in the first season, only. Unlike concentration of α-amino-N in roots juice in the first season, no significant differences in concentration of K and Na and loss sugar % due to ammonia gas injection were detected.

Top yield was increased by repeating foliar spraying with compost tea from 0 to three times. Plants sprayed once with compost tea significantly surpassed those sprayed twice or three time and the control plants in root yield, sugar yield, total sugar%, extraction of white sugar% and juice purity% in both seasons. The inverse was true in the concentration of K in root juice and loss suger%.

Plants received one foliar spray with compost tea at 90 kg N/feddan in the form of ammonia gas or at urea were among those having the highest root and sugar yields per feddan in both seasons.

It can be concluded that application of ammonia gas injection or urea at the rate of 90 kg N/feddan along with one foliar spray with compost tea is the recommended treatment for optimum root and white sugar yields in Kafr El-Sheikh area.

Key words: ***Ammonia injection, Sugar beet, Compost tea.***

INTRODUCTION

The sugar beet industry provides an important economic enterprise for farmers in several temperate climate zones throughout the world, with total production of nearly 7 million ha in 2000 (Draycott 2006).

The important of careful N management in sugar beet production is well known. Insufficient N limits root yield while excessive amounts reduce root sucrose content and increase impurities that interfere with sucrose extraction. In addition to its agronomic impact, N management has taken on even more significance in recent years because of its economic and environmental impacts.

Rising energy costs have caused the price of urea to roughly double since 2000 (ERS, 2005), and continued concern over NO_3-N contamination of water resources has caused reduction of N loss by leaching and runoff (Stevans *et al.,* 2007).

Field research has confirmed that point-injection provides measurable benefits in some cropping systems. (Blaylock and cruse 1992), compared broadcast and incorporated, and point-injection of N in ridge-till corn (*Zea mays* L.) and found that point-injection increased corn yield and fertilizer N uptake. In field experiments, cereals usually show in about half of the cases positive yield and quality response of point injection fertilization compared to conventional split surface application of fertilizers, while sugar beet yields and qualities are mainly unaffected.

In another study, fertilizer N use efficiency was higher with point-injection than with surface-banded or knife-banded application in no-till corn (Timmons and Baker, 1992). (Vestch and Randall 2000), showed point-injection improved no-till corn yield compared with broadcasting N following either corn or soybean (*Glycine max* L.). Point injection has also been successfully adapted to reduced-tillage small grain production, where it provides the advantage of subsurface placement with minimal disturbance of the surface residue layer.

Fertilizer N recovery in no-till winter wheat (*Triticum aestivum* L.) was greater with point injection than with surface broadcast applications (Janzen *et al.,* 1991). (Schelegel *et al.* 2003) concluded that improved yield and a lower optimum N application rate made point injection more profitable than broadcast and incorporated in reduced tillage winter wheat. With sugar beet, N placement may be even more important than with other common crops owing to the importance of early season N availability to sugar beet yield. (Milford *et al.,* 1985a, 1985b).

Consequently, the precision placement achieved using point injection make this application method attractive as a means to improve N use efficiency in furrow-irrigated sugar beet production.

Compost tea for increased crop health and fertility. Years of research and results in the field have demonstrated the power of this technology, which is growing in popularity. Compost tea is a liquid solution or suspension made

by steeping compost in water. It is used as both a fertilizer and in attempts to prevent plant diseases. The tea may be rapidly deactivated when foliar applied due to sunlight rain and UV radiation. However, on the soil surface, the microbes in the tea will colonize plant litter and debris, and improve decay rates. (httd://en.wikipedia.org/wiki/composttea).

Compost tea extracts prepared from composted manure, composted pine bark, an organic farm composted, or cattle yard maste, applied as foliar sprays. Compost tea is used for two reasons: To inoculate microbial life into the soil or onto the foliage of plants. and to add soluble nutrients to the foliage or to the soil to feed the organism and the plants present. (Steve Diver 2009). Compost tea revealed significant positive effects on tomato yield, biomass, number of fruits and root weight in comparison to the control. On the other hand, compost tea increased vitamin C content (El-Hanafi Septi, K. 2005).

There is great interest among sustainable growers about the use of compost tea for increase crop health and fertility. Years of research and results in the field have demonstrated the power of this technology, Which is growing in popularity.

We hypothesize that point injection is a more effective method of applying N to sugar beet than broadcast. Our objectives were to compare sugar beet yield and quality in response to different N placement methods, and optimum N application rate. Also to study the effect of foliar spray of compost tea on sugar beet yield and quality

MATERIALS AND METHODS

Field studies were conducted at the Sakha Agricultural Research Station, Agricultural Research Center during 2007/2008 and 2008/2009 seasons. The soil belongs to heavy clay soil-relevant chemical properties for the soil are shown in Table (1).

Table (1): Soil chemical properties for experimental area at 0-30cm depth.

Seasons	pH	EC m mhos cm	Organic matter %	Available			Available g/l		
				N ppm	P ppm	K ppm	HCO^{-}_{3}	SO^{--}_{4}	CO^{--}_{3}
2007/2008	8.1	3.50	1.65	16.1	6.2	300	5.9	0.21	0.001
2008/2009	8.3	3.40	1.70	16.0	6.2	290	6.1	0.19	00

General cultural practices:

Primary tillage at site in both seasons was accomplished by mold board plow in the fall. Secondary tillage was two passes with the roller-harrow. Phosphorus fertilizer in the form of calcium super phosphate (15 % P_2O_5) was applied before the planting operation according to recommendations(60 Kg P_2O_5/fed.). Sugar beet followed soybean at site in both seasons. Sugar beet seed (Gloria) was planted by mechanical method at a depth of 30 mm in

mid-August for all years. Seed was planted in rows spaced 60 cm apart target seed spacing was 15 cm.

Experimental methods:

Experimental units were assigned using a split plot design. The dimensions of each experimental unit were 3 x 7 m. Treatments were replicated three times and consisted of a factorial combination of N application rates and methods. N applied in the form of urea according to recommendations (broadcast) by hand. Nitrogen placement consisted of point-injection (PI) in the form of ammonia gas using a spoke-wheel injector.

PI treatments, which were applied before planting about one week so as to achieve utilizing and accurate placement with respect to the speed row. For PI treatments, a six-row spoke-wheel applicator injected gas-ammonia with injection points 20 cm apart and 15 cm below the soil surface. Nitrogen was applied at rates of 90 kg N/fed as urea (control), 80, 90 and 100 kg N/fed as ammonia in the main plots.

Compost tea foliar rates were, (no spray, once spray at 60 days from sowing, two sprays at 60 days and 75 days from sowing and three sprays at 60,75 and 90 days from sowing) in sub plots- Compost tea is a liquid produced by leaching soluble nutrients and extracting bacteria from compost. Compost tea is commercial name, was provided from Microbiology Department, Agric. Res. Center, Ministry of Agriculture, Egypt. Root samples were harvested in late May by hand of two rows from the center of each plot.

It was determined as average of ten guarded plants at harvest to estimate root and top weight per plant

Root and top yields per plot transformed to metric tons per feddan. Sucrose content (or pol reading) and Soluble non-sugar content, as potassium, sodium and α-amino nitrogen in meq/100 gm in root juice in each treatments were determined in Delta company of sugar by means of an automatic sugar polarimetter according to Le Docte as described by McGinnus (1971). Juice purity percentage (QZ) was calculated as the ratio between sucrose and total soluble solids (TSS) percentage in roots. Extractable white sugar percentage (B%), corrected sugar content (white sugar) of beet was calculated by linking the beet non-sugar K, Na and α-amino N according to Olddfield *et al.* (1979) as follows:

$$ZB = pol-(0.343\ K + Na) + 0.094\ NB_1 + 0.29)$$

Where:

ZB = Corrected sugar content % (in beet).

Pol = Gross sugar %

NB_1 = α amino N determined by (the blue number method).

Loss sugar % = gross sugar % - white sugar %.

Sugar yield per Fadden was calculated from root yield per feddan multiplied by sucrose %.

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

Purity percentage = 99.36- [14.27 (V_1+ V_2+ V_3/V_4)].

Where:

V_1 = Sodium meq/100gm V_2 = Potassium meq/100gm

V_3 = α-amino-N meq/100gm V_4 = Sucrose % (pol %)

RESULTS AND DISCUSSION

1- Root and top yields:

Root yield and top yield as affected by ammonia gas injection, foliar spraying of compost tea and their interaction in 2007/08 and 2008/09 seasons are presented in (Table 2).

1.a. Effect of ammonia injection:

Rate of ammonia gas injection substantially influenced top and root yields (t/feddan) in both seasons. The relative ranking of ammonia gas injection for top and root yields was inconsistent in the two seasons. Plants received nitrogen with the recommended rate (90 kg N/feddan) in the form of urea or ammonia gas were among those producing higher top and root yields per feddan in both seasons. There was no significant difference in top and root yields between plants received ammonia gas or urea fertilizer at the rate of 90 kg N/feddan in the two season. The lowest top and root yields were obtained from plants received 80 kg N/feddan before sowing as ammonia gas injection in soil in both season. Such effect of nitrogen might have been resulted from increased photosynthetic area which resulted in more photosynthetic production and consequently increased top and root yields. Stevens et al (2007) found that increasing N application rate tended to increase root yield at most sites.

1.b. Effect of compost tea spraying:

Foliar spraying times of compost tea had a significant effect on top and root yields per feddan in both seasons. Top yield was increased by repeating foliar spraying with compost tea from 0 to three times. No significant difference in top yield was recognized among plants which sprayed twice or three times with compost tea in the two seasons. However, application of compost tea as a foliar spraying resulted in a significant increase in root yield compared with control treatment (without spraying) in the two seasons. Plants sprayed once with compost tea out yielded those sprayed twice or three time and the control plants in root yield in both seasons. Root yield decreased by repeating foliar sprays with compost tea from once to three time. This may be due to excessive vegetative growth by increasing foliar application times of compost tea up to three sprays, which increased

overlap between the leaves of adjacent plants and led to increase mutual-shading, respiration and transpiration and in turn caused a reduction in translocation of photosynthetic production to roots. This seemed to increase impurities in root juice, or because compost teas improve the life in the soil and on plant surface. Steve (2009) reported that.

1.c. Effect of interaction :

Top and root yield were significantly affected by the interaction between ammonia injection and foliar spraying of compost tea in both seasons (Table 2). The relative ranking of the interaction between ammonia injection and foliar spraying of compost tea for root yields was inconsistent in the two seasons (Table 3). Plants received one foliar spray with compost tea at 80 or 90 kg N/feddan in the form of ammonia gas and at 90 kg N/feddan in the form of urea were among those having the highest root yields per feddan in both seasons. Plants received 80 kg N as ammonia gas injection without spraying with compost tea produced the lowest root yield.

Table (2): Top and root yields as affected by ammonia injection, foliar spraying of compost tea and their interaction in 2007/08 and 2008/09 seasons.

Factors	Top yield (Ton/fed)		Root yield (Ton/fed)	
	2007/08	2008/09	2007/08	2008/09
Ammonia injection. (N)				
90 kg N/fed. as urea (control)	12.250 a	11.750 a	30.975 ab	31.948 a
80 kg N/fed. as ammonia	10.000 b	9.667 c	29.159 b	28.313 b
90 kg N/fed. as ammonia	11.750 a	11.667 a	32.995 a	30.076 ab
100 kg N/fed. as ammonia	12.000 a	10.667 b	30.838 ab	28.906 b
F-test	*	**	**	**
Compost tea foliar rates (C)				
No spray	10.917 b	10.583 b	27.565 c	26.091 d
One spray	10.667 b	8.583 c	34.725 a	33.987 a
Two sprays	11.917 a	12.000 ab	31.697 b	28.625 c
Three sprays	12.500 a	12.583 a	29.979 b	30.541 b
F-test	**	**	*	**
Interaction				
N x C	**	**	*	**

Means of each factor designated by the same letter are not significantly different at 5% level using Duncan's multiple range test.

Table (3): Root yield (ton/fed.) as affected by the interaction between ammonia injection and foliar spraying of compost tea in 2007/08 and 2008/09 seasons.

Ammonia injection	Foliar spraying of Compost tea (No.)			
	0	1	2	3
	2007/08 season			
90 kg N/fed. as urea	26.667 gh	36.449 a	31.476 cde	29.305 efg
80 kg N/fed. as ammonia	25.326 h	33.647 a-d	29.742 ef	27.921 fgh
90 kg N/fed. as ammonia	28.476efg	35.878 ab	34.407 abc	33.220 a-d
100 kg N/fed. as ammonia	29.792 ef	32.927 bcd	31.163 de	29.471 efg
	2008/09 season			
90 kg N/fed. as urea	24.286 e	34.610 a	33.233 ab	35.660 a
80 kg N/fed. as ammonia	24.285 e	34.130 a	28.213 cd	26.624 de
90 kg N/fed. as ammonia	26.618 de	34.111 a	28.798 cd	30.777 bc
100 kg N/fed. as ammonia	29.175 cd	33.096 ab	24.253 e	29.101 cd

Means followed by the same letter are not significantly different at 5% level according to Duncan's multiple range test.

2- Quality of root juice:

The soluble non-sugars, potassium, sodium and α-amino nitrogen in the roots are regarded as impurities because they interfere with sugar extraction. (Abu El-Fotoh; *et al* 2000) Means of these impurities, gross sugar %, extractable white sugar %, loss sugar %, and juice purity % in root juice as affected by ammonia gas injection, foliar spraying of compost tea and their interaction in 2007/08 and 2008/09 seasons are presented in (Tables 4 & 5).

2.a. Effect of ammonia injection:

Unlike concentration of α-amino-N in roots juice in the first season, no significant differences in all mentioned impurities and loss sugar % due to ammonia gas injection were detected. Ammonia gas injection in soil before sowing resulted in a significantly decrease in concentration of α-amino-N in roots juice compared with adding urea fertilizer at the rate of 90 kg N/feddan in the first season. The concentration of total sugar, extraction of white sugar and juice purity were increased significantly by injection soil with ammonia gas up to the rate of 90 kg N/feddan compared with control (application of urea at the rate of 90 kg N/feddan) in the first season, only. This is may be due to high efficiency of N-fertilizer in case of ammonia injection than broadcast (as urea).

2.b. Effect of compost tea spraying:

Foliar spraying times of compost tea had a significant effect on all mention traits of root juice quality, except the concentration of α-amino-N in roots juice. Application of compost tea as a foliar spraying resulted in a significant decrease in the concentration of K in root juice and loss sugar % compared with control treatment (without spraying) in the two seasons. The inverse was true in the concentration of Na in root juice. The relative ranking of foliar spraying time of compost tea for the percentages of total sugar,

extraction of white sugar and juice purity was inconsistent in the two seasons. Root of plants sprayed once with compost tea among those having higher total sugar%, extraction of white sugar% and juice purity% than root of control plants. Such increase in extraction of white sugar% in this treatment may be due to decreasing impurities and increasing total sugar%. So increasing these impurities in roots decreased extraction of white sugar and purity.

2.c. Effect of interaction :

The interaction between ammonia injection and foliar spraying of compost tea exerted a significant effect on total sugar%, concentration of K and Na, extractable white sugar %, loss sugar %, and juice purity % in root juice in the first season, only.

Table (4): Percentages of sucrose, potassium, sodium and α amino N in root juice as affected by ammonia injection and foliar spraying of compost tea in 2007/8 and 2008/9 seasons.

Factors	Sucrose %		Potassium (meq/100g)		Sodium (meq/100g)		α-amino N (meq/100g)	
	2007/08	2007/08	2007/08	2008/09	2008/09	2008/09	2007/08	2008/09
Ammonia injection. (N)								
90 kg N/fed. as urea (control)	17.2 c	17.8	4.7	4.6	1.6	1.6	2.3 a	1.8
80 kg N/fed. as ammonia	17.9 ab	17.8	4.8	4.7	1.5	1.6	1.6 b	1.5
90 kg N/fed. as ammonia	18.2 a	18.0	4.6	4.6	1.5	1.5	1.8 b	1.7
100 kg N/fed. as ammonia	17.6 bc	17.9	4.7	4.6	1.7	1.7	1.9 b	1.6
F-test	**	NS	NS	NS	NS	NS	**	NS
Compost tea foliar rates (C)								
Zero sprays	17.5 b	17.9 a	6.0 a	5.7 a	1.4 c	1.4 b	2.1	1.9
One sprays	18.2 a	17.9 a	4.1 c	4.3 b	1.5 b	1.5 ab	1.9	1.8
Two sprays	17.6 b	18.0 a	4.2 c	4.1 c	1.7 a	1.7 a	1.7	1.7
Three sprays	17.6 b	17.6 b	4.5 b	4.4 b	1.7 a	1.8 a	1.8	2.0
F-test	*	*	**	**	**	*	NS	NS
Interactions								
N x C	**	NS	**	NS	*	NS	NS	NS

Means of each factor designated by the same letter are not significantly different at 5% level using Duncan's multiple range test.

3- Sugar yield (ton/fed.):

Sugar yield as affected by ammonia gas injection, foliar spraying of compost tea and their interaction in 2007/08 and 2008/09 seasons are presented in Table 5.

There was no significant difference in sugar yield between plants received ammonia gas or urea fertilizer at the rate of 90 kg N/feddan in the second season. This may be due to the increase root yield and extraction of white sugar at injection of ammonia gas with the rate of 90 kg N/feddan before sowing.

3.a. Effect of ammonia injection:

Rate of ammonia gas injection substantially influenced sugar yield/feddan in the two seasons. Plants received nitrogen with the recommended rate (90 kg N/feddan) in the form of ammonia gas were among those producing higher sugar yield per feddan in both seasons. These results are harmony with sucrose percentage and root yield in both seasons. Sucrose yield is typically adjusted based on the amount of impurities in the root, which interfere with sugar refinement (Stevans. et al 2007).

3.b. Effect of compost tea spraying:

Foliar spraying times of compost tea had a significant effect on sugar yield per feddan in both seasons. Application of compost tea as a foliar spraying resulted in a significant increase in sugar yield compared with control treatment (without spraying) in the two seasons. Plants sprayed once with compost tea surpassed plants of other treatments in both seasons. This may be due to the increase root yield and extraction of white sugar at the mentioned treatment.

Table (5): Percentages of loss sugar, extractable white sugar and quality as well as affected by ammonia injection and foliar spraying of compost tea in 2007/08 and 2008/09 seasons.

Factors	Loss sugar%		White sugar%		Quality%		Sugar yield t/fed.	
	2007/08	2008/09	2007/08	2008/09	2007/08	2008/09	2007/08	2008/09
Ammonia injection. (N)								
90 kg N/fed. as urea (control)	2.6	2.6	14.6 c	15.1	84.3 b	85.1	4.580 b	4.877 a
80 kg N/fed. as ammonia	2.7	2.6	15.2 ab	15.2	85.0 ab	85.4	4.588 b	4.291 b
90 kg N/fed. as ammonia	2.6	2.5	15.6 a	15.4	85.8 a	85.9	5.122 a	4.636 ab
100 kg N/fed. as ammonia	2.7	2.6	14.9 bc	15.3	84.7 ab	85.4	4.643 b	4.424 b
F-test	NS	NS	**	NS	*	NS	*	**
Compost tea foliar rates C								
Zero sprays	3.2 a	2.9 a	14.4 c	15.0 b	81.7 d	83.7 c	3.918 d	3.928 c
One sprays	2.4 c	2.5 c	15.8 a	15.4 a	86.7 a	86.2 a	5.481 a	5.241 a
Two sprays	2.5 bc	2.4 c	15.1 b	15.7 a	86.0 b	86.8 a	4.943 b	4.486 b
Three sprays	2.6 b	2.6 b	15.0 b	15.1 b	85.4 c	85.1 b	4.590 c	4.572 b
F-test	**	**	**	**	**	**	**	**
Interactions N x C	**	NS	**	NS	**	NS	**	**

Means of each factor designated by the same letter are not significantly different at 5% level using Duncan's multiple range test.

1.c. Effect of interaction :

Sugar yield was significantly affected by the interaction between ammonia injection and foliar spraying of compost tea in both seasons (Table 6). Plants received one foliar spray with compost tea at application of either ammonia gas or urea produced the highest sugar yield per feddan in both seasons, while those received urea at the rate of 90 kg N/feddan without spraying with compost tea produced the lowest one in both seasons.

It can be concluded that application of ammonia gas injection or urea at the rate of 90 kg N/feddan along with one foliar spray with compost tea is the recommended treatment for optimum root and white sugar yields in Kafr El-Sheikh area.

Table (6): Sugar yield (ton/fed.) as affected by the interaction between ammonia injection and foliar spraying of compost tea in 2007/08 and 2008/09 seasons.

Ammonia injection	Foliar spraying of Compost tea (No.)			
	0	1	2	3
	2007/8 season			
90 kg N/fed. as urea	3.15 e	5.668 a	4.906 b	4.595 bc
80 kg N/fed. as ammonia	4.203 d	5.362 a	4.486 cd	4.301 cd
90 kg N/fed. as ammonia	4.162 d	5.563 a	5.459 a	5.306 a
100 kg N/fed. as ammonia	4.161 d	5.332 a	4.919 b	4.158 d
	2008/9 season			
90 kg N/fed. as urea	3.300 f	5.592 a	5.16 ab	5.456 a
80 kg N/fed. as ammonia	3.685 ef	5.011 bc	4.444 cd	4.021 de
90 kg N/fed. as ammonia	4.343 d	5.198 a	4.597bcd	4.405 d
100 kg N/fed. as ammonia	4.382 d	5.163 a	3.741 ef	4.407 d

Means followed by the same letter are not significantly different at 5% level according to Duncan's multiple range test.

REFERENCES

Abou El-Fotoh, H-G, A.A. Abd El-magid and R.E. Knany (2000) Effect of biofertilization on sugar beet yield, quality and optimization of the chemical fertilizers. Proc.gth conf. Agron.,Minifia Univ.,1-2 sept. 2000:561-567.

Blaylock, A.D. and R.M. Cruse (1992). Ridge-tillage corn response to point-injected nitrogen fertilizer. Soil Sci. Soc. Am. J. 56:591–595.

Draycott, A.P. (2006). Introduction. p. 1–8. In Draycott (ed.) Sugar beet . Blackwell Publ., Oxford, UK.

Duncan, B. D. (1955). Multiple rang and multiple F-test Biometrics 11:1- 42

El-Hanafi Sebti, K. (2005). Compost tea effects on soil fertility andplant growth of organic tomato (selenium lycopersicum Mill) in comparison with different organic fertilizers- Email: *occhialini@iamb.it; and ir@iamb.it -96 ref. thesis (M.S.C) Italy.*

Economic Resource Service. (2005). U.S. fertilizer use and price [Online]. Available at www.ers.usda.gov/Data/FertilizerUse [cited 13 Apr. 2006, verified 14 June 2007]. USDA, Washington, DC.

Gomes, K.A. and A.A. Gomes (1984). Statistical procedures for agricultural research. An International Rice Research Institute Book John Willey and Sons. Inc., New York

Janzen, H.H., T.L. Roberts and C.W. Lindall (1991). Uptake of point-injected nitrogen by winter wheat as influenced by time of application. Soil Sci. Soc. Am. J. 55:259–264.

Martin Kucke and Jorge-Michael Greg (2006). Experimental results and practical experiments with the fluid fertilizers point injection fertilization and to minimize environmental pollution 18th world congress of soil science july 9-15,2006 Philadelphia Pennsylvania. USA.

Milford, G.F.J., T.O. Pocock, J. Riley and A.B. Messem (1985a). An analysis of leaf growth in sugar beet. III. Leaf expansion in field crops. Ann. Appl. Biol. 106:187–203.

Milford, G.F.J., T.O. Pocock, J. Riley and A.B. Messem (1985b). An analysis of leaf growth in sugar beet. IV. The expansion of the leaf canopy in relation to temperature and nitrogen. Ann. Appl. Biol. 107:335–347.

MeGinnus, R.A. (1971). Sugar beet technology, 2thed. Sugar beet Development Foundation, Fot., Collins., Colo, USA..

Olddfield and G. M. Turner (1979). British geomagne;ic curve 10,000-O B.P. for dating European sediments Geophys. Res. Lett. 6: 249-252.

Schlegel, A.J., K.C. Dhuyvetter and J.L. Havlin (2003). Placement of UAN for dryland winter wheat in the central high plains. Agron. J. 95:1532–1541.

Steve Diver (2009). Compost tea frequently asked questions. www.attra.org. sustainable Growth, inc.2116 N.28th street Boise, ID83703

Timmons, D.R. and J.L. Baker (1992). Fertilizer management effect on recovery of labeled nitrogen by continuous no-till corn. Agron. J. 84:490–496 .

Vetsch, J.A. and G.W. Randall (2000). Enhancing no-tillage systems for corn with starter fertilizers, row cleaners, and nitrogen placement methods. Agron. J. 92:309–315.

Stevens, Alan D.Blaylock, James M.Krall,Bryan G.Hopkins and Jason Wellsworth (2007). Sugar beet yield and nitrogen use efficiency with pre plant broadcast, banded or point-injected nitrogen application. Published in Agron.J 99:1252-1259 (2007), USA.

تقييم الحقن بالامونيا ورش الكمبوست السائل علي إنتاجية بنجر السكر

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الملخص العربي

أقيمت تجربتان حقليتان بالمزرعة البحثية لمحطة البحوث الزراعية بسخا – كفر الشيخ خلال موسمي ٢٠٠٧/٢٠٠٨، ٢٠٠٨/٢٠٠٩ . بهدف دراسة تقييم الحقن بالامونيا ورش الكمبوست السائل علي إنتاجية وجودة بنجر السكر

وقد استخدم تصميم القطع المنشقة مرة واحدة لدراسة تأثير التسميد باليوريا بالمعدل الموصي به (٩٠ كجم أزوت/ فدان) كمعاملة كنترول واستخدمت عملية حقن التربة بالأمونيا الغازية بمعدلات (٨٠ ، ٩٠ ،١٠٠ كجم أزوت/فدان) قبل الزراعة بأسبوع. وهذه المعاملات النيتروجينيه وضعت في القطع الرئيسية وتم استخدام مستخلص الكمبوست السائل المحتوي علي أنواع مختلفة من الكائنات الدقيقة المفيدة وذلك في أربعة مستويات وهي (صفر ، رشة واحدة ، رشتين ، ثلاث رشات) وتم توزيع معاملات الرش هذه عشوائيا في القطع الشقية.

وأظهرت النتائج المتحصل عليها أن معاملات التسميد النيتروجيني كان لها تأثير معنوي علي كل من محصول العرش والجذر والسكر للفدان ، حيث تم الحصول علي أعلي القيم عند استخدام ٩٠ كجم نيتروجين للفدان في صورة يوريا أو عن طريق الحقن في صورة غاز الامونيا في كلا الموسمين.

كما زاد التركيز الكلي للسكر والسكر الأبيض ونقاوة العصير حيث زادت قيم هذه الصفات عند حقن التربة بغاز الأمونيا بمعدل ٩٠ كجم نيتروجين للفدان مقارنة بمعاملة الكنترول وذلك في الموسم الأول فقط، بينما لم يكن للحقن بغاز الامونيا تأثير معنوي علي محتوي الجذور من البوتاسيوم أو الصوديوم أو الالفا امينو نيتروجين في الموسم الأول

زاد محصول العرش بتكرار الرش بالكمبوست السائل من (صفر إلي ٣ رشات). وقد سجل محصول الجذر ومحصول السكر ونسبة السكر الكلي والسكر الأبيض ونقاوة العصير اعلي معدلاتها عند استخدام الرش مرة واحدة مقارنة بالرش مرتين أو ثلاثة أو بمعاملة الكنترول. ومن ناحية أخري انخفض تركيز البوتاسيوم في عصير الجذور ونسبة السكر المفقود.

أظهرت النتائج أن نباتات بنجر السكر التي تم إضافة النيتروجين لها بمعدل ٩٠ كجم نيتروجين للفدان عن طريق حقنه بالتربة في صورة غاز الامونيا أو إضافته في صورة يوريا والتي تم رشها مرة واحدة بمستخلص الكومبوست أعطت اعلي محصول للجذور والسكر في كلا الموسمين.

عامة يمكن أن نستخلص من هذه الدراسة وتحت ظروف هذا البحث أن حقن الامونيا بالتربة في صورة غاز أو إضافته في صورة يوريا بمعدل ٩٠ كجم أزوت للفدان مع الرش مرة واحدة بمستخلص الكمبوست يمكن أن ينصح به للحصول علي محصول عالي من بنجر السكر ذو جودة عالية.