

ABSTRACT

Seham Yousef Mohamed Abo-Steet. EVALUATION OF FERTILIZATION EFFICIENCY WITH GASEOUS AMMONIA OF CORN AND SUNFLOWER CROPS IN DIFFERENT SOIL TYPES.

Ph D Thesis, Ain Shams Univ., Agricultural Science Institute of Environmental Studies and Research 2011

Two field experiments were carried out at experimental private farms at Deamo (sandy clay loam soil) and Kfor El-Nile regions (clay soil), El-Fayoum Governorate, Egypt during the summer seasons 2006 and 2007. The present investigation was proposed to determine fertilization efficiency of nitrogen fertilization sources (Anhydrous ammonia, ammonium sulphate and urea) and rates (100, 120 and 140 Kg N/fed.) applied to corn (*Zea mays L. cv. single hybrid 10*) and rates (50, 70 and 90 Kg N/fed.) applied to sunflower (*Helianthus annus L. cv.sakha 53*) at the investigated different soil types (clayey – sandy clay loam). The obtained results indicated that increasing anhydrous ammonia was significantly increased the dry matter yield of leaves, stems and nutrients content at 45 and 65 days (vegetative stage) after sowing in both seasons for corn and sunflower . Also the application of anhydrous ammonia to sunflower plants significantly increased the crude protein, and oil concentrations in both seasons. The maximum seeds yield and seed index of sunflower was achieved at 90 Kg N/fed. as anhydrous ammonia in both seasons. The best corn grain yield and grain index was achieved at 120 Kg N/fed. when anhydrous ammonia was applied to soil in both seasons.

Key words:

Corn (*Zea mays L*) – Sunflower (*Helianthus annuis L*) – Nitrogen- Anhydrous Ammonia - Injection- Urea –Ammonium sulphate- Soil type - Growth - Yield.

المستخلص

سهام يوسف محمد أبو ستيت . تقويم كفاءة التسميد بالأمونيا الغازية لمحصولي الذرة وعباد الشمس في أنواع الأراضي المختلفة . رسالة دكتوراه ، معهد الدراسات والبحوث البيئية- قسم العلوم الزراعية -جامعة عين شمس ٢٠١١ .

أجريت تجارب ميدانية في اثنتين من المزارع الخاصة في منطقة د مو (تربة طينية طميية رملية) و منطقة كفور النيل (طينية)، محافظة الفيوم، مصر خلال موسم صيف ٢٠٠٦، ٢٠٠٧ وقد استخدمت مصادر مختلفة للتسميد النتروجيني (الأمونيا الغازية - كبريتات الأمونيا - اليوريا) وبمعدلات (١٠٠ - ١٢٠ - ١٤٠ كجم ن/ فدان) لمحصول الذرة الشامية (*Zea mays* L. هجين فردي ١٠) وبمعدلات (٥٠ - ٧٠ - ٩٠ كجم ن/ فدان) لمحصول دوار الشمس (*Helianthus annuus* سخا٥٣)

وأظهرت النتائج ان الأمونيا الغازية أدت لزيادة كبيرة في المحصول الجاف من الذرة الشامية وعباد الشمس ، و كذلك وزن الأوراق والسيقان الجافة عند عمر ٤٥ و ٦٥ يوما من الزراعة (المرحلة الخضري) في كلا الموسمين. وكذلك أدت إلى زيادة في محتوى العناصر الغذائية في النبات).

كما أدى استخدام الأمونيا الغازية إلى الحصول على أعلى محصول حبوب للذرة وكذلك أعلى محصول بذور لعباد الشمس وأعطى زيادة كبيرة في البروتين الخام وتركيز الزيت في كلا الموسمين.

أعطى التسميد بمعدل ١٢٠ كجم ن / فدان للذرة الشامية أعلى محصول حبوب للفدان بينما تسميد دوار الشمس بمعدل ٩٠ كجم ن/ فدان أدت إلى إنتاج أعلى محصول للبذور/ فدان . أعطى تسميد الذرة بمعدل ١٢٠ كجم ن/ فدان ودوار الشمس بمعدل ٩٠ كجم ن/ فدان في صورة الامونيا الغازية أعلى محصول من الحبوب والبذور للفدان في الأرض الطينية والأرض الطينية الرملية تحت ظروف محافظة الفيوم

CONTENTS

	Page
1. INTRODUCTION	1
2. REVIEW OF LITERATURE	4
2.1. Effect of nitrogen fertilizers rates on growth and grain yield	4
2.1.1. Corn	4
2.1.2. Sunflower	9
2.2. Effect of different nitrogen source on growth and yield of corn and sunflower.....	10
2.2.1..Anhydrous ammonia.....	13
2.2.2 Mineral nitrogen fertilizers.....	16
2.3. Effect of nitrogen fertilizers on soil and plant chemical components	17
2.3.1. Soil chemical properties.....	20
2.3.2. Plant chemical components.....	22
2.4. Effect of different nitrogen sources on soil pollution.....	22
3. MATERIALS AND METHODS	26
3.1. Soil sampling	26
3.2. Seeds Material	26
3.3. Anhydrous ammonia	28
3.4. Experimental practices	28

3.5 Methods of analysis.	30
3.5.1. Plant analysis	30
3.5.2. Soil analysis	31
3.6. Statistical analysis	32
4. RESULTS AND DISCUSSIONS	33
4.1. Plant growth and yield as affected by nitrogen source , rate ,soil type and their interactions.....	33
4.1.1. Corn leaves and stem dry weights after 45 days from sowing.....	33
4.1.2. Corn leaves and stem dry weights after 65 days from sowing.....	37
4.1.3. Corn grain and straw yields at harvest.....	42
4.1.4. Corn grain index	47
4.1.5. Corn grain protein content (%)......	50
4.1.6. Nitrogen uptake by corn leaves and stem after 45 days from sowing)	53
4.1.7. Nitrogen uptake by corn leaves and stem after 65 days from sowing.....	57
4.1.8. Nitrogen uptake by corn grain and straw at harvest...	61
4.1.9. Nitrogen use efficiency of corn (grain weight Kg N unit).....	65
4.1.10. Phosphorus (P) uptake by corn leaves and stem after 45 days from sowing.....	67

4.1.11. Phosphorus (P) uptake by corn leaves and stem after 65 days from sowing.....	71
4.1.12. Phosphorus (P) uptake by corn grain and straw at harvest.....	74
4.1.13. Potassium (K) uptake by corn leaves and stem after 45 days from sowing	77
4.1.14. Potassium (K) uptake by corn leaves and stem after 65 days from sowing.....	81
4.1.15. Potassium (K) uptake by corn grain and straw at harvest.....	84
4.2 Sunflower plant (Helianthus annuis L.) growth and yield as affect by nitrogen source, rates, soil type and their interactions.....	88
4.2.1. Sunflower leaves and stem dry weights (g/plant) after 45 days from sowing	88
4.2.2. Sunflower leaves and stem dry weights (g/plant) after 65 days from Sowing.....	92
4.2.3. Sunflower seeds and stover yields (Kg/fed.) at harvest.....	96
4.2.4. Sunflower seeds index.....	101
4.2.5. Sunflower seeds protein content (%) and oil (%)...	104
4.2.6. Nitrogen uptake by sunflower leaves and stem after 45 days from sowing.....	108

4.2.7. Nitrogen uptake by sunflower leaves and stem after 65 days from sowing.....	112
4.2.8. Nitrogen uptake by sunflower seeds and stover at harvest.....	115
4.2.9. Nitrogen use efficiency of sunflower (seed weight Kg N unit).....	119
4.2.10. phosphorus (P) uptake by sunflower leaves and stem (g/plant) after 45 days from sowing.....	121
4.1.11. phosphorus(P) uptake in sunflower leaves and stem (g/plant) after 65 days from sowing.....	125
4.1.12. phosphorus (P) uptake by sunflower seeds sand stover at harvest.....	128
4.2.13. potassium (K) uptake by sunflower leaves and stem (g/plant) after 45 days from sowing.....	131
4.1.14. potassium (K) uptake in sunflower leaves and stem (g/plant) after 65 days from sowing.....	134
4.1.15. potassium (K) uptake by sunflower seeds sand stover at harvest.....	138
 5-SUMMARY AND CONCLUSION.....	142
6-REFERENCES.....	145

ARABIC SUMMARY