RESPONSE OF SOME FIELD CROPS TO SLOW RELEASE FERTILIZERS

By

REDA EL-SAYED YOUNES ESSA

B. Sc. Agric. Sci. (Soil Science), Fac. Agric., Cairo Univ., 2000
M. Sc. Agric. Sci. (Soil Science), Fac. Agric., Cairo Univ., 2009

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APPROVAL SHEET

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APPROVAL COMMITEE

Dr. ESMAT HASSAN ATTIA NOUFAL.....

Professor of Soils, Fac. Agric., Banha University.

Dr. MOHAMEDY IBRAHIM EL-KHERBAWY.....

Professor of Soils, Fac. Agric., Cairo University.

Dr. HANEM ABD EL-RAHMAN SIBAK .....

Professor of Chemical Eng., Fac. Eng., Cairo University.

Dr. SAYED TAHA ABOU-ZEID .....

Professor of Soils, Fac. Agric., Cairo University.

Date: 30/3/2015

SUPERVISION SHEET

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SUPERVISION COMMITTEE

Dr. SAYED TAHA ABOU-ZEID

Professor of Soils, Fac. Agric., Cairo University

Dr. HANEM ABD EL-RAHMAN SIBAK

Professor of Chemical Eng., Fac. Eng., Cairo University

Dr. AMEL LOTFI ABD EL-LATIF

Associate Professor of Soils, Fac. Agric., Cairo University

Name of Candidate: Reda El-Sayed Younes Essa **Degree**: Ph.D.
Title of Thesis: Response of Some Field Crops to Slow Release Fertilizers.
Supervisors: Dr. Sayed Taha Abou Zeid
Dr. Hanem Abd El-Rahman Sibak
Dr. Amel Lotfi Abd El-Latif
Department: Soil Science **Branch:** **Approval:**30/3/2015

ABSTRACT

Trials were conducted to produce certain local slow release fertilizers using either synthetic or natural materials. An evaluation for each fertilizer in the laboratory by evaluation their activity index and diffusivity urea fertilizers coating with sulphur, phosphogypsum or bentonite result in clear depression in the amounts of released nitrogen. The highest effect being found with both imported sulphur coated urea (SCU) next bentonite coated urea (BCU) next phosphogypsum coated urea (PGCU). Results indicate that the diffusivity is nearly constant for thickness of sulphur (404.67) cm^2/sec and then it begins to decrease after one day dissolution time. This may be attributed to the fact that after certain dissolution time a shrinkage occur resistant to dissolution may be formed which inhibit the dissolution characteristics. Observed that an average value of (483.09) cm^2/sec may be considered as diffusivity of urea through solid bentonite. From which it may be observed that an average value of (704.80) cm^2/sec may be considered as diffusivity of urea through solid phosphogypsum. This can be attributed to fact that coating layer of urea that is formed by speaking resistant to degradation by the characteristics of each material.

Two field experiments were carried out during the two consecutive summer seasons 2012 and 2013 at "El-Hakmia", "El-Dakahilia" Governorate, Egypt to study the effect of fertilizers application of SCU, BCU and PGCU on yield, yield components and chemical constituents and quality of Maize (single hybrid 10) soybean (Giza 111) under clay soil condition. Sulphur coated urea (SCU), phosphogypsum coated urea (PGCU) and bentonite coated urea (BCU) were compared with conventional urea (U) were applied at 80, 100 and 120 kg N/fed for maize and 20, 40 and 60 kg N/fed for soybean. Results suggest that increase of grain yield among all treatments compared with urea. The results showed an increase in the yield of grain yield between all transactions compared to uncoated urea. Nitrogen fertilizers slow release improved quantity and quality of maize and soybeans and all the treatments given the large increase of seed yield and yield components and chemical composition of seeds, and treatment of urea coated with sulfur at rate of 120 kg N/fed excelled in all traits in both seasons.

Slow release fertilizers showed significant heavily in plant height; seed/plant weight, 100-seed weight, seed yield/fed and straw yield/fed as well as seeds of NPK, and protein, total carbohydrates and percentage oil from the non-coated urea. The results also showed that soybean crop is more responsive to the various forms of coated urea from maize. The results showed that all forms of coated urea increased grain or seeds by 4-10% for maize from 3 to 16% for soybeans. It was also noted that the addition of urea coated with sulphur at rate of 100 kg N/fed to maize was given as a result of effective and similar or more than that obtained uncoated urea at rate of 120 kg N/fed and similarly to soybean when the use of urea coated with sulphur at rate of 40 kg N/fed gave the result is equal to or better seed yield of 60 kg N/fed than uncoated urea, therefore, these results suggest the possibility of reducing rates of use fertilizers for both crops if slow release fertilizer was used for uncoated urea.

Key words: U, SCU, BCU, PGCU, Activity Index, Diffusivity, Maize, Soybean.

DEDICATION

I dedicate this work to my beloved family; to my wife Dr. Shimaa Metwally, and my sons Mazen and Rawan for their patience and help.

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LIST OF ABBREVIATIONS

AAPFCO	Association of American Plant Food Control Officials
AGR	Absolute Growth Rate
AI	Activity index
AN	Ammonium Nitrate
AS	Ammonium Sulphate
AVI	Availability Index
BCCU	Bamboo Charcoal Coated Urea
BCU	Bentonite Coated Urea
BMD	Biomass Duration
CCF	Common Compound Fertilizers
CGR	Crop Growth Rate
CRF	Control Release Fertilizers
CRNF	Control Release Nitrogen Fertilizers
CU	Coated Urea
CU	Conventional Urea
CUDA	Common Urea as a Dressing Application
CWIN	Cold Water Insoluble Nitrogen
HWIN	Hot Water Insoluble Nitrogen
IBDU	Isobutylendene diurea
LA/plant	Leaf area/plant
LAI	leaf area index
LSD	Least Significant Difference
ns	No Significant
NU	Normal Urea
NUE	Nitrogen Use Efficiency
PAR	Photosynthetic Active Radiation
PC	Plantacote
PE	Poly Ethylene
PGCU	Phosphogypsum Coated Urea
SCR	Slow Coated Release
SCU	Sulphur Coated Urea
SRF	Slow Release Fertilizer
SRUF	Slow Release Urea Fertilizers
SUBA	Slow Released Urea as a Basal Application
TVA	Tennessee Valley Authority
UF	Urea Form

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