Effect of sulphur addition on biochemical components of onion (*Allium cepa*) and its productivity grown in salt affected soil

Presented by

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APPROVAL SHEET

Thesis Title

Effect of sulphur addition on biochemical components of onion (*Allium cepa*) and its productivity grown in salt affected soil

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ABSTRACT

Student Name: Marwa Adel Qotob Ibrahim

Title of the Thesis: Effect of sulphur addition on biochemical components of onion (*Allium cepa*) and its productivity grown in salt affected soil.

Degree: Master Degree (Biochemistry)

Abstract: The objective of this study is to evaluate the effect of sulphur addition, fertilization of ammonia gas, ammonium nitrate or urea on biochemical components and pungency of onion plants grown on salt affected soil. Two field experiments were carried out on salt affected soil clay loam in texture at the farm of Tamyia, El Fayoum Governorate during two agricultural successive seasons *i.e.* 2013/14 and 2014/15 on onion (*Allium cepa*) plant (cv. Giza 20) to investigate the effect of elemental sulfur, some sources of nitrogen and organic compost on the biochemical components grown on salt affected soil.

The obtained data representing the responses of onion plants to the application of elemental sulphur rates and different sources of nitrogen at maximum growth stage. Data indicated a relative difference between sulphur rates application (without, 100 and 120 Kg S fed^{-1}), where at rate 100 Kg S fed^{-1}showed slightly increase for chlorophyll a, chlorophyll b, total chlorophyll and carotenoids. Data showed that the sulphur at rate 100 Kg S fed^{-1} was the best rate for total amino acids, free amino acids and total protein according to the mean values 41.9 mg g^{-1} as total amino acids, 7.60 mg g^{-1}as free amino acids and 13.82 % as total protein. As mentioned before, the response of pungency (pyruvic acid) and bulb quality as (pyruvic acid, total carbohydrate and total soluble solid), yield and yield components of onion plant for the sulphur rates (120 Kg S fed^{-1}) have the same behavior where the application sulphur rate 100 Kg S fed^{-1} was the most favourable treatment.

By taking in consideration the compost effect as an organic nitrogen source the data revealed that the combination between the organic nitrogen source and inorganic source like (ammonia gas, ammonium nitrate and urea) gave a different result such that obtained from fertilization by inorganic nitrogen sources sole where results of ammonia gas withdrawn than results of ammonium nitrate. Consequently, the order of nitrogen sources will be follow the descending order of: ammonium nitrate > ammonia gas > urea and order of nitrogen sources sole will be follow the descending order of: ammonia gas > ammonium nitrate > urea.

Finally, regard to the soil cultivated with onion plants the highest values were at ammonia gas without sulphur and ammonium nitrate with compost at 120 Kg S fed^{-1} for pH, EC_e, cations and anions. Data also, showed that the application of inorganic nitrogen sole give highest available nitrogen, phosphorous and potassium values but, when inorganic nitrogen sources a combined with organic source the values were decreased in case of ammonia gas application while at ammonium nitrate or urea application values of NPK were increased when organic compost a combined with ammonium nitrate or urea.

Data indicated that the elemental sulphur application at rate 100 Kg S fed^{-1} was followed the descending order: 100 Kg S fed^{-1} > 120 Kg S fed^{-1} > without sulphur. Nitrogen sources application as inorganic sources sole or inorganic sources combined with organic source. The application of ammonia gas sole was more effective than application of ammonia gas combined with compost while ammonium nitrate or urea gave higher values than ammonium nitrate or urea application sole.

Key words: Elemental sulphur, biochemical components, pungency, onion plants and salt affected soil.

* One hectare (ha) = 2.4 fed

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List of Abbreviations

A.O.A.C.	Association of Official Agricultural Chemists
AAS	Atomic Absorption Spectroscope
ACSOs	S- Alkenyl Cysteine Sulfoxides
ACT	Aerated Compost Tea
BD	Bulk density
C/N ratio	Carbon- Nitrogen ratio
CEC	Cationic Exchangeable Capacity
CL	Clay Loam
CMO	Choline monooxygenase
cmole	Centimoles
DAP	Di- Ammonium Phosphate
df	dilution factor
DNA	Deoxyribonucleic Acid
DNPH	Di Nitro Phenyl Hydrazine
ds	Decisiemens
DTPA	Di-ethylene Tri-amine Penta Acetic acid
DW	Dry weight
EC	Electronic Conductivity
EDDHA	Ethylene di-amine-N,N'-bis(2-hydroxyphenylacetic acid)
EDTA	Ethylene di-amine tetra acetic acid
ESP	Exchangeable sodium percentage
FAO	Food and agriculture organization
Fed.	Feddan
FW	Fresh weight
GSH	Glutathione
MCSO	S- methyl- L- cysteine sulfoxide
meq	Melli equivalent
MSW	Municipal solid waste
MT	Mega ton
NCT	Non aerated compost tea
NPK	Nitrogen, phosphorous and potassium
PCSO	S- propyl- L- cysteine sulfoxide

PRENCSO	Propenyl L- cysteine sulfoxide
QACs	Quaternary Ammonium Compounds
S.	Sulphur
SAR	Sodium adsorption rate
SAS	Soil associated standards
TCA	Tri chloro acetic acid
TDS	Total dissolved solids
TEA	Tri- ethanol amine
tRNA	Transfer ribonucleic acid
ZPC	Zero point of charge
γ-GP	γ- glutamyl peptides