



شبكة المعلومات الجامعية

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

Ain Shams University Information Network
جامعة عين شمس

شبكة المعلومات الجامعية

@ ASUNET



شبكة المعلومات الجامعية التوثيق الالكتروني والميكروفيلم



شبكة المعلومات الجامعية

جامعة عين شمس

التوثيق الالكتروني والميكروفيلم

قسم

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها
علي هذه الأفلام قد أعدت دون أية تغييرات



يجب أن

تحفظ هذه الأفلام بعيدا عن الغبار

في درجة حرارة من ١٥-٢٥ مئوية ورطوبة نسبية من ٢٠-٤٠%

To be Kept away from Dust in Dry Cool place of
15-25- c and relative humidity 20-40%

بعض الوثائق الأصلية تالفة



بالرسالة صفحات نم ترد بالاصل

9/10
Cp

SPATIAL VARIABILITY OF SOIL PHYSICAL PROPERTIES IN NEWLY RECLAIMED AREA

By

ABDEL AZIZ MOHAMED TALAAT MOSTAFA FAHMY

B.Sc. Agric., (Soils), Cairo University, 1983

M.Sc., Agric. (Soils), Suez Canal University, 1991

A thesis submitted in partial fulfillment

of

the requirements for the degree of

DOCTOR OF PHILOSOPHY

in

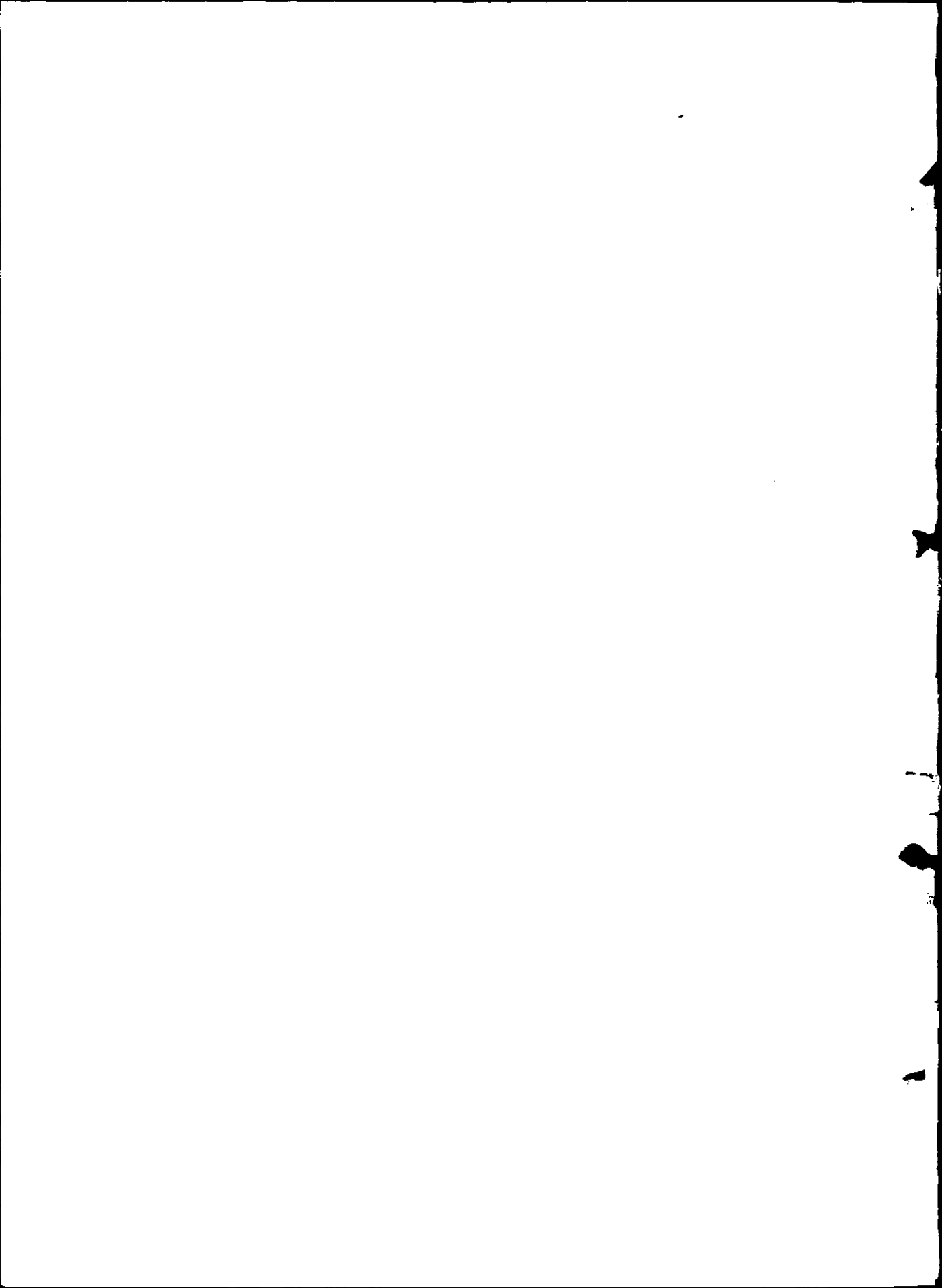
Agriculture Sciences

(Soil Science)

Department of Soil Science
Faculty of Agriculture
Ain Shams University

1998

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APPROVAL SHEET

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This thesis for Ph.D. degree has been approved by :

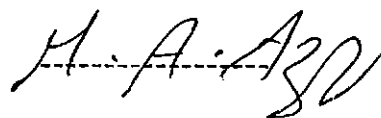
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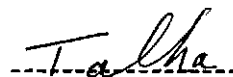
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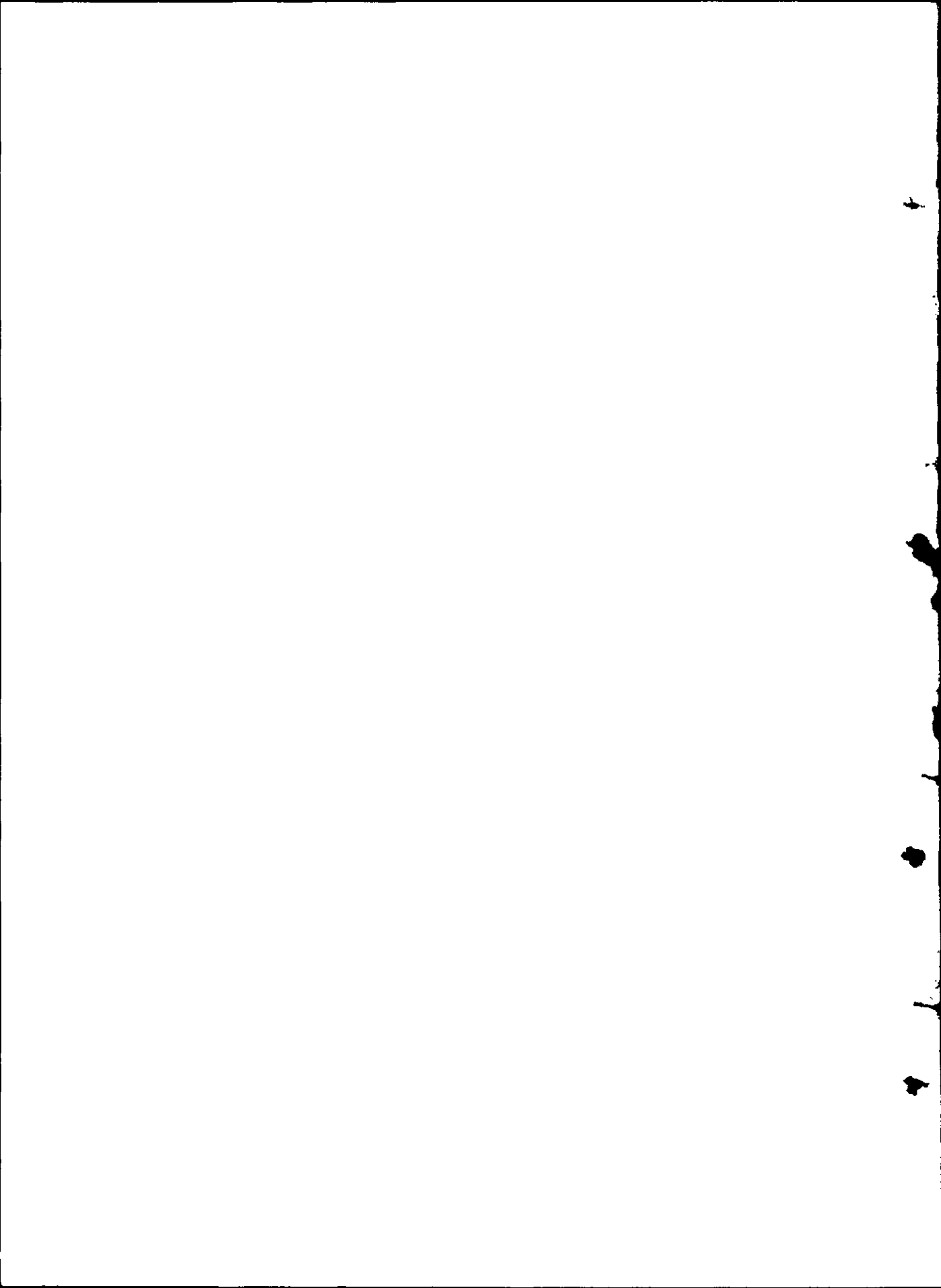


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Date of examination : // / 2 / 1998



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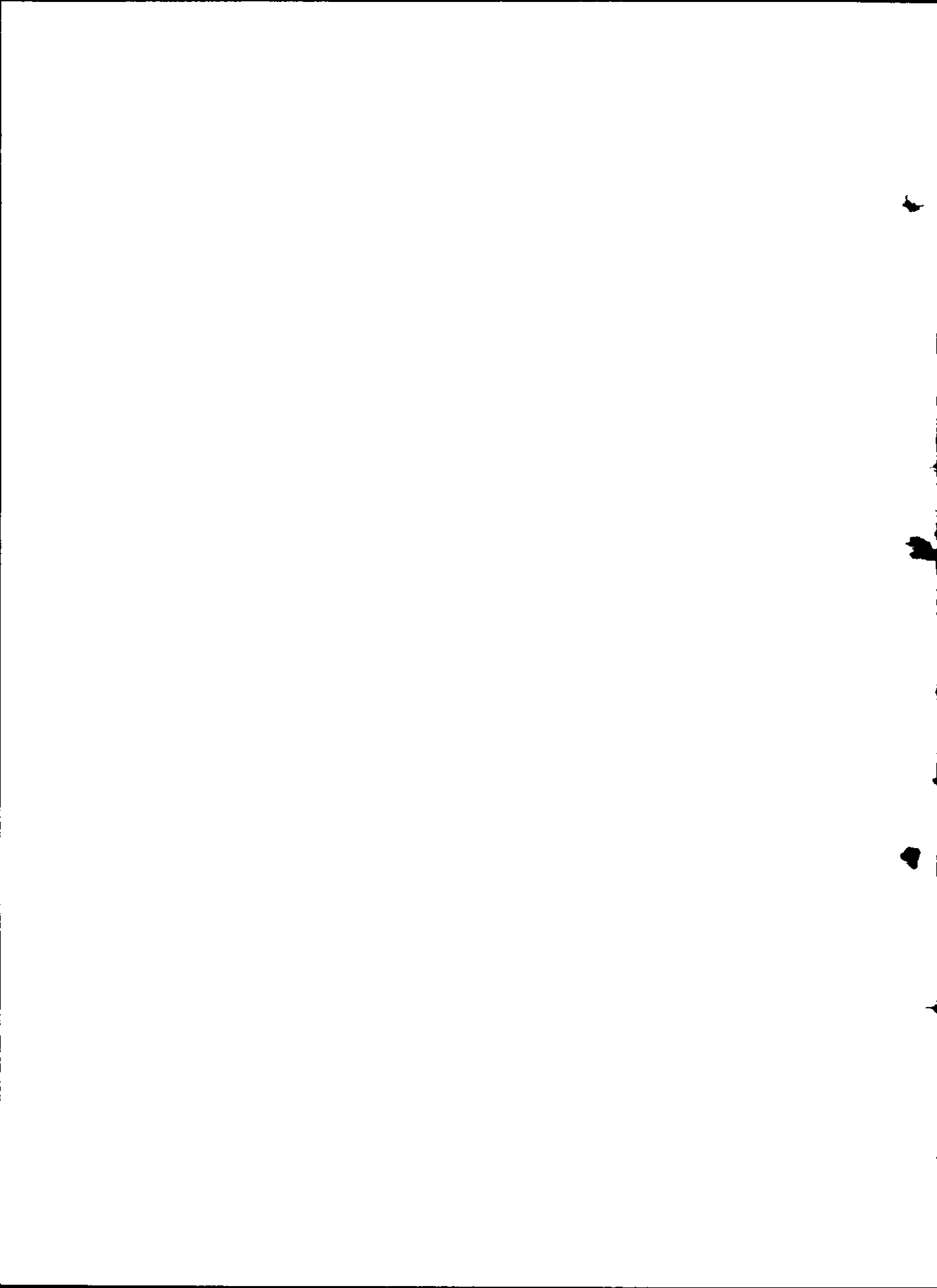
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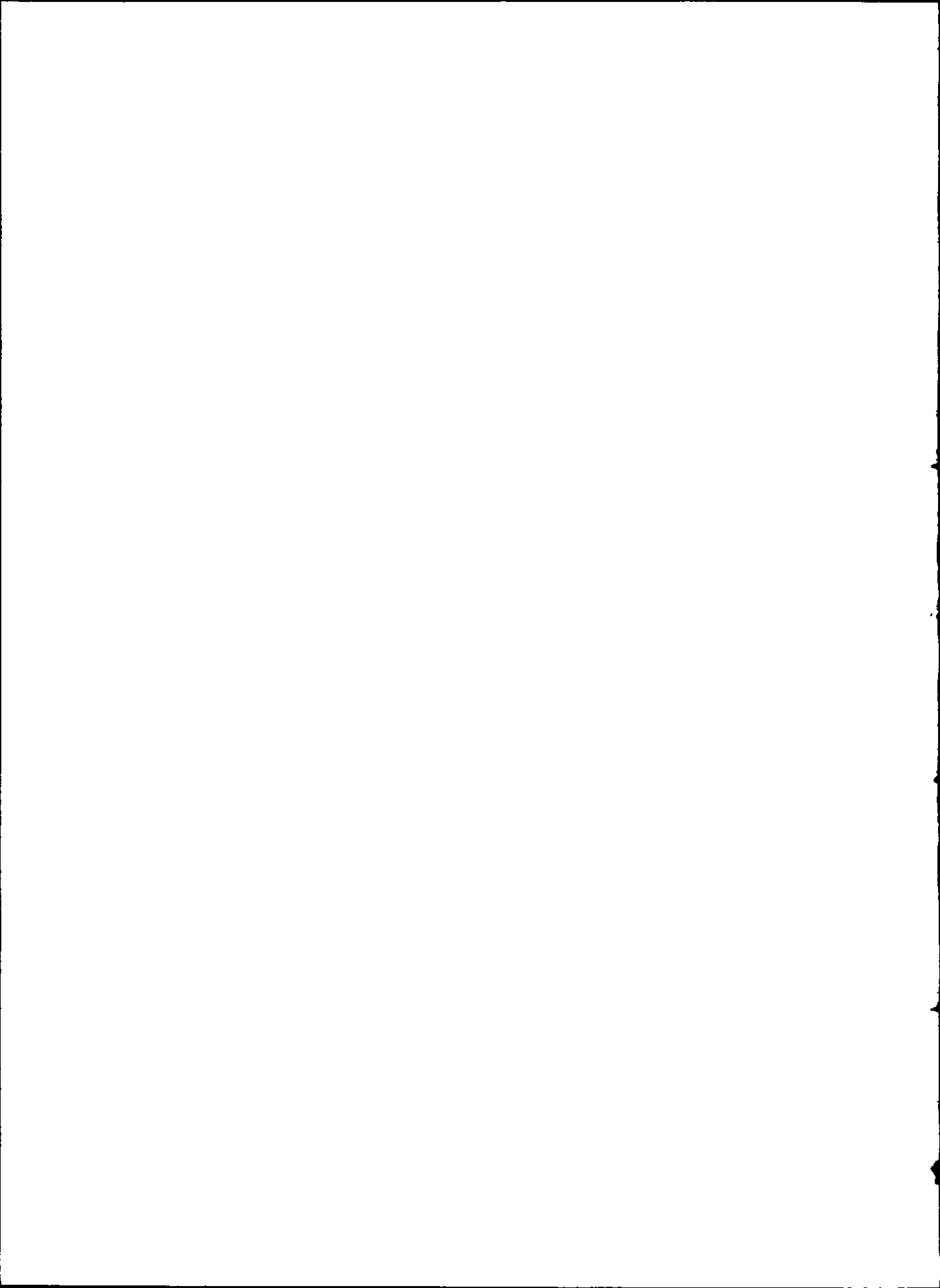


ACKNOWLEDGMENT

The author wishes to express his sincere gratitude to **Prof. Dr. Mahmoud Talha El Maghraby**, Professor of Soil Science, Soils Department, Faculty of Agriculture, Ain Shams University and **Prof. Dr. El-Tony M. Ali**, Professor of Soil Science in the same Department for their supervision and valuable guidance throughout the course of this work.

The author also wishes to express his gratefulness and appreciation to **Prof. Dr. Mahmoud Yousef Afifi**, Professor of Soils and Chairman of The Division of Water Resources and Desert Soils, Desert Research Center, for his supervision, continuous encouragement and help in accomplishing this work.

Special thanks are also extended to the Academy of Scientific Research and Technology for the financial grant for printing this dissertation.



ABSTRACT

Spatial variability of soil physical properties in newly reclaimed area. Abdel Aziz Mohamed Talaat Mostafa Fahmy. Ph.D. Thesis, University of Ain Shams, Faculty of Agriculture, Department of Soil Science, 1998.

The current work was conducted to evaluate the spatial variability in some basic soil physical properties. Such properties included mechanical fractions, bulk density, infiltration rate, sorptivity and hydraulic conductivity.

The study was carried out in the area of Burg El-Arab Agriculture Experiment Station, Desert Research Center (DRC). The soils of this area is mainly sandy clay loam and highly calcareous (45-65% CaCO_3).

Three transects were laid out. The first was on W-E direction, and extended 185 m, the second was on N-S direction for 220 m and the third was on NW-SE direction for 350 m. The number of sampling sites were 38, 45 and 51 for the 1st, 2nd and 3rd transects, respectively. At each site soil samples were collected at 0-25 and 25-60 cm depth.

Variabilities of soil physical properties were determined using two statistical methods; namely, Classical statistics and Geostatistics.

1. Soil physical properties:

The conventional statistics indicated that gravel and, in few cases, sand displayed skewed frequency distribution which fitted the lognormal model better than the normal one. Therefore, the optimum number of samples required for determining the mean gravel content within 10% of the true mean varied from 85 to 128 in the topsoil and from 111 to 167 in the subsoil. Meanwhile, the number of samples required for the determination of sand ranged from 50 to 79 and from 92 to 136 for the topsoil and subsoil, respectively.

On the other hand, data of silt and clay fractions, except few cases, displayed approximately symmetric normal frequency distribution. Consequently, the optimum number of samples required to determine their mean values was relatively low and ranged between 30 and 52 for silt and from 36 to 60 for clay. The data also revealed that the coefficient of variations (CV) for mechanical separates ranged from 10 to about 40%, indicating intermediate variability.

Calcium carbonate: Calcium carbonate contents in the topsoil and subsoil fitted the normal frequency distribution. The CV ranged between 10.02 and 12.92%, indicating intermediate variability.

Bulk density: The obtained results indicated that bulk density values in top and subsoil fit the normal frequency distribution. CV values ranged between 4 and 10%, indicating very low variability.

Infiltration rate: The values of infiltration rate along the three transects fit the Gaussian or normal frequency distribution. The CV ranged between 50-61%, indicating intermediate variations.

Sorptivity: Sorptivity data revealed that the CV values ranged between 44 and 52%, indicating intermediate variability and fitted the lognormal frequency distribution.

Hydraulic conductivity: The data fitted the lognormal frequency distribution and the CV values ranged between 35-47%, i.e. intermediate variability.

2. Geostatistics of soil physical properties:

Particle size fractions: The obtained results indicated that, most of the mechanical separates along the different geographical directions exhibited spatial correlation with distance.

Calcium carbonate: Calcium carbonate values indicated the presence of highly significant spatial dependence.

Bulk density: Bulk density data revealed the presence of highly significant spatial dependence.

Infiltration rate: Infiltration data delineated significant spatial independence.

Sorptivity: Sorptivity data declared that its distribution was random (pure nugget effect).

Hydraulic conductivity: Hydraulic conductivity data showed no significant correlation (spatial dependent) in the topsoil. While the reverse was true for the subsoil layer.

3. Soil chemical properties:

Soil chemical properties including salinity, cation exchange capacity and pH have been discussed.

Key words: Calcareous soil, soil physical properties, mechanical fractions, calcium carbonate, bulk density, infiltration rate, sorptivity, hydraulic conductivity, autocorrelation, semivariogram, kriging.