بسم الله الرحمن الرحيم

MONA MAGHRABY

شبكة المعلومات الجامعية

التوثيق الالكتروني والميكروفيلم

MONA MAGHRABY

شبكة المعلومات الجامعية

التوثيق الإلكتروني والميكروفيلم

جامعة عين شمس

التوثيق الإلكتروني والميكروفيلم

قسم

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها
علي هذه الأقراص المدمجة قد أعدت دون أية تغيرات

يجب أن

تحفظ هذه الأقراص المدمجة بعيدا عن الغبار

MONA MAGHRABY

QUALITATIVE AND QUANTITATIVE ANALYSIS OF GRADES IN LONG AND EXTRA-LONG STAPLE VARIETIES OF EGYPTIAN COTTON

BY

MAHMOUD GAMAL HUSSEIN MOHAMED

B.Sc. Agric. Sci., (Dairy Technology), Fac. Agric., Cairo Univ., 2011

A thesis Submitted in Partial Fulfillment
OF
the Requirements for the Degree of

MASTER OF SCIENCE
in
Agricultural Sciences
(Crop Breeding)

Department of Agronomy
Faculty of Agriculture
Ain Shams University

2020

Approval Sheet

QUALITATIVE AND QUANTITATIVE ANALYSIS OF GRADES IN LONG AND EXTRA-LONG STAPLE VARIETIES OF EGYPTIAN COTTON

By

MAHMOUD GAMAL HUSSEIN MOHAMED

B.Sc. Agric. Sci., (Dairy Technology), Fac. Agric., Cairo Univ., 2011

This thesis for M.Sc. degree has been approved by:

Dr. Hassan Auda Awaad **……**
Prof. of Crop Breeding, Faculty of Agriculture, Zagazig, University.

Dr. Ali Mohamed Esmail **……..…**
Prof. Emeritus of Crop Breeding, Faculty of Agriculture, Ain Shams University.

Dr. Amal Zakaria Amin Mohamed **……**
Prof. of Crop Breeding, Faculty of Agriculture, Ain Shams University.

Dr. Afaf Mohamed Tolba **……..**
Prof. Emeritus of Crop Breeding, Faculty of Agriculture, Ain Shams University.

Date of Examination: / / 2020

QUALITATIVE AND QUANTITATIVE ANALYSIS OF GRADES IN LONG AND EXTRA-LONG STAPLE VARIETIES OF EGYPTIAN COTTON

By

MAHMOUD GAMAL HUSSEIN MOHAMED

B.Sc. Agric. Sci., (Dairy Technology), Fac. Agric., Cairo Univ., 2011

Under the supervision of:

Dr. Afaf Mohamed Tolba

Prof. Emeritus of Crop Breeding, Agronomy Department, Faculty of Agriculture, Ain Shams University (Supervisor).

Dr. Abd El-Maksoud M. El-Marakby

Prof. Emeritus of Crop Breeding, Agronomy Department, Faculty of Agriculture, Ain Shams University.

Dr. Amal Zakaria Amin Mohamed

Prof. of Crop Breeding, Agronomy Department, Faculty of Agriculture, Ain Shams University.

Dr. Ibrahim Ahmed Mahmoud Ebaido

Senior Researcher, Cotton Grading Department, Cotton Research Institute, Agricultural Research Center.

ABSTRACT

Mahmoud Gamal Hussein Mohamed, "Qualitative and Quantitative Analysis of Grades in Long and Extra-Long Staple Varieties of Egyptian Cotton". Unpublished Master of Science Thesis, Ain Shams University, Faculty of Agriculture, Agronomy Department, 2020.

The materials used in this study were four commercial varieties of Egyptian cotton; two (Giza 86 and Giza 90) belonging to the long staple class and the others (Giza 88 and Giza 92) belonging to the extra-long staple category. Within each variety, nine lint cotton grades namely: Fully Good (FG), Good/Fully Good (G/FG), Good (G), Fully Good Fair/Good (FGF/G), Fully Good Fair (FGF), Good Fair/ Fully Good Fair (GF/FGF), Good Fair (GF), Fully Fair/Good Fair (FF/GF) and Fully Fair (FF) were used to study the relationship of descriptive grades with actual staple and cotton yarn attributes estimated by devices and to estimate the extent to which each of the technological characteristics contributes to the quantitative estimation of grade in the Egyptian cotton.

Fiber properties were measured by using the Cotton Classifying System Version-5 instrument (CCS-V5). Results were collected for the following characteristics: reflectance degree (Rd%), yellowness degree (+b), trash%, dust%, fiber fragments%, total trash%, No. of neps, Micronaire value, fiber maturity ratio%, linear density, upper half mean length (mm), short fiber index%, mean fiber length (mm), fiber uniformity index%, fiber strength (g/tex) and fiber elongation%.

Mean squares due to all nine grades of long and extra-long staple cotton varieties in combined analysis over two seasons were highly significant for all studied characters with some exceptions, revealing the presence of sufficient genetic variability in the studied grades.

Highly significant mean performance values of the four cotton varieties and the nine lint grades for each variety for all studied

characters, indicating clear significant genetic differences between studied varieties and fiber cotton lint grades within each variety.

Gradual increase for yellowness degree, trash%, dust%, fiber fragments%, total trash% (trash, dust, fiber fragments), number of neps and short fiber index%, while gradual decrease for reflectance degree (Rd%), micronaire value, fiber maturity ratio%, linear density, upper half mean length, mean fiber length, fiber uniformity index%, fiber strength and fiber elongation% with significant level as transfer for all tested varieties from (FG) grade down to the (FF) grade.

All studied varieties showed highly significant negative correlation values between fiber cotton grade and each of yellowness (+b), trash%, dust%, fiber fragments%, total trash%, No. of neps and short fiber index. Highly significant positive correlation was found between cotton grade with reflectance degree%, micronaire value, maturity value%, fiber density, upper half mean length, mean fiber length, fiber uniformity index, fiber strength and fiber elongation%. Total trash% followed by micronaire value as well as fiber maturity ratio% and their interactions were the most contributing and influencing traits in fiber cotton grade. Also, these properties and their joint effects are prevailing factors which affect the personal judgment of the grader at evaluating the cotton grade.

The results also showed that there is a great coincidence between descriptive evaluation of sorting in some traits such as different impurities and yellowness degree with quantitative evaluation by devices, which gives the opportunity to cotton spinners to choose the method from which they obtain accurate results and are commensurate with the conditions of the spinning process.

Key wards: Cotton grade**,** Long staple, Extra-long staple, Performance, Correlation and path coefficient analysis.

ACKNOWLEDGMENT

First, the author expresses his gratitude to **Almighty Allah** who enabled him to complete this work.

Since appreciation is expressed to late **Dr. A. M. El-Marakby,** Professor Emeritus of Plant Breeding, Agronomy Department, Faculty of Agriculture, Ain Shams University and to late **Dr. Kh. M.M. Hussein,** Senior Researcher, Cotton Grading Department, Cotton Research Institute, for suggesting the problem, drawing the plan of the work, help and guidance during the courses and the work of this study until his passing away in beginning of August 2019.

The author wishes to express his deepest and sincere appreciation to **Dr. Afaf M. Tolba,** Professor Emeritus of Plant Breeding, Agronomy Department, Faculty of Agriculture, Ain Shams University, for her supervision, valuable guidance, diligent discussion and constructive criticism throughout the course of this study and during writing the manuscript.

Sincere thanks for **Dr. Amal Z.A. Mohamed,** Professor of Plant Breeding, Agronomy Department, Faculty of Agriculture, Ain Shams University, for her valuable instruction, criticism and encouragement during the course of investigation.

Many thanks for **Dr. I. A. Ebaido**, Senior Researcher, Cotton Grading Department, Cotton Research Institute, for his guidance and encouragement during the course of investigation.

Sincere thanks for **Dr. K.I.M. Ibrahim,** Professor Emeritus of Plant Breeding, Agronomy Department, Faculty of Agriculture, Ain Shams University, for his help and guidance in statistical analysis of data.

Deepest thanks are also extended to the staff and fellow colleagues of Cotton Res. Inst. for their kind help, cooperation and facilities provided throughout this work. Also I would like to extent my sincere thanks to all

staff members of Agronomy Department, Faculty of Agriculture, Ain Shams University, for their encouragement and valuable help during the course of this work.

I am particularly grateful to my wife and my family for their help and continuous encouragement and support during my study and entire life.

CONTENTS

LIST OF TABLES

INTRODUCTION

Cotton crop is the first important fiber crop worldwide because it provides the raw material to the entire textile industry (**Abdel-Mohsen and Amein 2016**). The Egyptian cotton "*Gossypium barbadense* L." is a peculiar type of cotton that is characterized by softness, strength, superior characteristics, high quality, and gained a worldwide reputation for more than a century and half as being of the highest lint quality among world cottons **(Abdel-Salam *et al*. 2009)**.

From many years, merchants, classers and spinners, in different countries, have made their selections on the basis of the official cotton standers for staple length and grade supplemented by characters, but in U.S.A., staple length is not considered in the system of classification, since it is determined primarily by the variety. All Egyptian cottons are bought first according to variety and then according to the classified grade. Grade is a composite rating determined by color, the amount of foreign matter and micronaire in the sample and ginning preparation. "Preparation" refers to whether fiber is damaged or tangled in the processes of ginning and "Character" is a complex attribute which is composed of these elements not included in grade, such as fiber fineness, maturity, strength, uniformity, etc. However, in cotton classing, the determination of characters, as well as grade is entirely a personal judgment.

Grading of cotton is a very intricate and complex subject, as it depends upon human perceptions of sight and touch and requires a high degree of precision and power of critical judgment on the part of the grades of a set of samples belonging to a variety. Since personal judgment plays a large part in assigning the value of cottons characteristics under this conventional system of classification, the same" subjective method" is given to it in contrast with the "objective method' by which the value