GENETIC DIVERSITY ASSESSMENT IN SOME PLANTS OF SOLANACEAE FAMILY UTILIZING MOLECULAR MARKERS

By

SAMAR AHMED SALAH MESK
B.Sc. Agric. Sc. (Genetics), Fac. of Agric.,Ain Shams Univ., 2010

A Thesis Submitted in Partial Fulfillment
Of
The Requirements for the Degree of

MASTER OF SCIENCE
in
Agricultural Sciences
(Genetics)

Department of Genetics
Faculty of Agriculture
Ain Shams University

2018

Approval Sheet

GENETIC DIVERSITY ASSESSMENT IN SOME PLANTS OF SOLANACEAE FAMILY UTILIZING MOLECULAR MARKERS

By

SAMAR AHMED SALAH MESK

B.Sc. Agric. Sc. (Genetics), Fac. of Agric., Ain Shams Univ., 2010

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

Dr. Rshad Mahmoud Mohamed Shoaib……
Associate prof. of molecular genetics, National Research Center

Dr. Khaled Abd EL-Aziz Abd EL-Ati ……
Prof. of Genetics, Fac. of Agric.,Ain Shams University.

Dr. Ashraf BakryAbd EL-Razik ……
Prof. of Genetics, Fac. of Agric.,Ain Shams University.

Dr. Samir Abd EL-Aziz Ibrahim ……
Prof. of Genetics, Fac. of Agric.,Ain Shams University.

Date of examination: / / 2018

GENETIC DIVERSITY ASSESSMENT IN SOME PLANTS OF SOLANACEAE FAMILY UTILIZING MOLECULAR MARKERS

By

SAMAR AHMED SALAH MESK

B.Sc. Agric. Sc. (Genetics), Fac. of Agric., Ain Shams Univ., 2010

Under the supervision of

Dr. Samir Abd EL-Aziz Ibrahim (Principal supervisor)

Prof. of Genetics, Dept. of Genetics, Fac. of Agric., Ain Shams University.

Dr. Ashraf BakryAbd EL-Razik

Prof. of Genetics, Dept. of Genetics, Fac. of Agric., Ain Shams University.

Dr. Injy Mohamed Masoad

Researcher of Genetics and Cytology Unit, Dept. of Plant Genetic Resources, Desert Research Center

ABSTRACT

Samar Ahmed Salah Mesk. '' Genetic Diversity Assessment in some Plants of Solanaceae Family Utilizirng Molecular Markers'' Unpublished M.Sc. Thesis, Genetics Dep. Fac. Agric, Ain Shams Univ., 2018.

Four species of Solanaceae family were collected from North western coast and Saint Catherine and were completely identified and characterized on biochemical and molecular bases. Protein banding pattern using SDS-PAGE as well as four isozyme systems (peroxidase, poly phenyl oxidase, maltate dehydrogenase, alcohol dehydrogenase) were carried out to identify the biochemical genetic fingerprints. In addition, the molecular genetic fingerprints of the studied species were carried out using RAPD and 5 primers were succeeded to amplify DNA. The phylogenetic relationships based on the obtained data (SDS-PAGE banding pattern, isozyme variations and PCR products). Among different species were performed using NTSYS computer program and dendrogram were constructed. Also, the four species exhibited morphological variations which indicated that the phenotype differences among different species in different regions resulted from the environmental selection pressure and genetic diversity. In addition to, the soil samples of these species were collected to differentiate between them by chemical analysis and physical analysis.

Key words: Solanaceae, Lycium shwaii, fingerprints, SDS-PAGE, RAPD-PCR, ISSR, monlecular fingerprint.

ACKNOWLEDGMENT

First and foremost, I feel always indebted to Allah the most beneficent and merciful

I wish to express my deep gratitude and sincere appreciation tp **Prof. Dr. Samir Abd EL-Aziz Ibrahim** prof. emeritus of genetics , Dept. of Genetics, Faculty of Agric. Ain Shams university for his continuous supervision, continual guidance and encouragement during the course of this investigation.

I would also, like to express my deepest gratitude and thanks to **Prof. Dr. Ashraf Bakry Abd EL-Razik,** Prof. of Genetic, Dept. Of Genetics, Faculty of Agric. At Ain Shams university for his kindly supervision and valuable help through the course of this study.

And I wish to express my deep thanks to Dr. Inji Mohamed Masoud for her kind help

Many thanks to all staff members of Genetics, Dept. of Genetics, Faculty of Agric. Ain Shams university and all staff members of Desert Rsearch Center.

Finally, my Deep thanks to my husband, my mother, my mother in low of my husband, my sister and my lovely daughter for their help and love which support me during this work.

CONTENTS

LIST OF TABLES

LIST OF FIGURES

INTRODUCTION

Over the past decad, medicinal plants has become very crucial, Making a great impact on the health and commercial aspects. Medicinal plants playing a very important role in the healthcare system of large proportions of the human's populations. This is really true in developing countries, where medicinal plants have a long and uninterrupted history of use. Recognition and development of the medical and economic benefits of these plants are on the increase in both developing and industrial countries. Continuous usage of medicinal plants because of the high cost of western pharmaceuticals and healthcare. Biodiversity can be defined at genetic, specific and community levels of biological organization and its variability among living organisms in all sources. The value of biodiversity is the difference between the current or future value of a diverse range of genus/species/ ecosystem and the value of a less diverse range. It is not the gross value of all naturally derived goods and services. Plant diversity is an irreplaceable resource, providing raw materials for introduction, domestication as well as improvement programmers in agriculture and forestry. Evaluation of genetic diversity and relationships within and among crop genotypes and their wild relatives is necessary for basic studies on evolution and also for informed utilization and protection of plant genetic resources **(Rao and Hodgkin, 2002; Barcaccia, 2009; Govindaraj *et al*, 2015 and Brozynska *et al*, 2015).**

Rajora and Mosseler (2001) found out that, an essential objective of genetic resources conservation is to maintain genetic probity and natural levels of genetic diversity and to enhance genetic diversity in population and species where it has been extinct. He also found that genetic diversity is necessary for the long term survival of the species by populations because it provides the raw material for adoption and development, especially when environmental conditions have changed.

Medicinal plants plays an essential role among the traditional and modern systems. It was used a lot through various researchers and