شبكة المعلومات الجامعية

بسم الله الرحمن الرحيم

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 تغيرات

يجب أن

تحفظ هذه الأفلام بعيدا عن الغبار

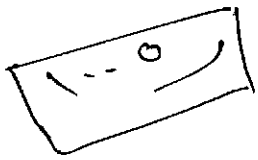
في درجة حرارة من ١٥-٢٥ مئوية ورطوبة نسبية من ٢٠-٤٠%

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

بعض الوثائق الاصلية تالفة

بالرسالة صفحات لم ترد بالاصل

USING PLANT TISSUE CULTURE TECHNIQUE FOR RAPID PROPAGATION



By

NIZAR ALI MUALLA

B.Sc.Agric.(Hort). Teshreen University , 1996
D.Sc.Agric.(Hort). Teshreen University , 1997

THESIS

Submitted in Partial Fulfillment Of The
Requirement For The Degree of
MASTER OF AGRIC.SCIENCE
(Plant Physiology)

Department of Agricultural Botany
Faculty of Agriculture
Cairo University

2001

USING PLANT TISSUE CULTURE TECHNIQUE FOR RAPID PROPAGATION

By

NIZAR ALI MUALLA

B.Sc.Agric.(Hort). Teshreen University (Lattakia), 1996
D.Sc.Agric.(Hort). Teshreen University(Lattakia) , 1997

THESIS

Submitted in Partial Fulfillment Of The
Requirement For The Degree of
MASTER OF AGRIC.SCIENCE
(Plant Physiology)

Supervisors

Prof.Dr. Eglal Mohamed Zaki Harb
Prof.Dr. Osama Mohamed El-Shihy
Prof. Dr.Ahmed Hussien Hanafy Ahmed

2001

بسم الله الرحمن الرحيم

قالوا سبحانك لا علم لنا إلا ما علمتنا إنك أنت العليم الحكيم

صدق الله العظيم

(سورة البقرة، ٣٢)

Name of Candidate : Nizar Ali Mualla **Degree**: Master
Title of thesis: Using plant tissue culture technique for rapid propagation
Supervisors: Prof. Dr. Eglal Mohamed Zaki Harb
Prof. Dr. Osama Mohamed El-Shihy, Prof. Dr. Ahmed Hussien Hanafy Ahmed
Department: Agriculture Botany
Branch Plant Physiology **Approval** 28/8/2001

Abstract

This study was carried out in the Biotechnology and Plant Analysis Lab. as well as in the green house of the Plant Physiology Division, Faculty of Agriculture, Cairo University.

The preliminary and the main experiments were done during the two successive seasons (1999-2000 and 2000-2001) to study the rapid propagation of banana by shoot tip culture and to produce banana plantlets which are more resistance to salinity be treated the shoot tips with chemical mutagen substance (ethyl methane sulphonate, EMS) by different concentrations (0, 10, 20, 30 and 40 mM) then cultured these shoot tips on MS media supplemented by different concentrations from sea salts (0 , 2000,4000, 6000 , 8000 ppm) and transferred the resulted of plants to green house for acclimatization.

The results can be summarized as follows:

Shoot tip culture is a rapid and economic multiplication method to production of large numbers of plants at short time when compared with other multiplication ways (every shoot tip gave above 400 plants after 5 months by 30 mM EMS treatment).

Salinity caused significant decreases in survival rate, shoot number, shoot length, root number, root length, leaves number, fresh weight and also in photosynthetic pigments, N, P , K , Mg and Fe concentrations

Salinity caused a significant increase in total sugars, total soluble phenols, free amino acids, proline, Na and Ca concentrations. The obtained data indicated the possibility of successful application of the treatment with EMS as chemical mutagen to improve salinity tolerance of banana, and that was related with the increasing in concentrations of tolerant salt stress substances such as; total sugar, free amino acids, proline and soluble phenols in plant tissues with salinity level increasing. Also the data showed the successful of the treatment shoot tips of banana with EMS to economic multiplication of banana under the increasing of feed gape.

Eglal Harb

APPROVAL SHEET

Name : Nizar Ali Mualla .

Thesis title : USING PLANT TISSUE CULTURE TECHNIQUE FOR RAPID PROPAGATION

This thesis for the Master degree in Plant Physiology has been approved by :

Prof. Dr. Mohamed Fawzi Abdel - Hamed M. F.

Prof. Dr. Yehia Hassan El-Shafey Y.H El-Shafey

Prof. Dr. Eglal Mohamed Zaki Harb. Eglal Harb

Prof. Dr. Osama Mohamed El – Shihy . O. M. Elshihy

Committee in charge

Date : / / 2001

ACKNOWLEDGMENT

Firstly my unlimited thanks to " Allah "

The author wishes to express his sincere thanks, deepest gratitude and appreciation to **Prof. Dr. Eglal Mohamed Zaki Harb**,Professor of Plant Physiology , Faculty of Agriculture, Cairo University, for her kind help, supervision during the progress of the work, the preparation of this manuscript and her interest and continuous valuable encouragement.

Faithful thanks, sincere appreciation and deep gratitude are due to **Prof. Dr. Osama Mohamed El-Shihy,** Professor of Plant Physiology (Plant Biotechnology) , Plant Physiology Division , Faculty of Agriculture, Cairo University, for his supervision during the progress of the work, for suggesting the problem, drawing the plan of the work, his valuable guidance.

Special deep appreciation and deep gratitude are due to **Prof. Dr. Ahmed Hussien Hanafy Ahmed**, Professor of Plant Physiology , Faculty of Agriculture, Cairo University, for his supervision during the progress of the work, his useful help, guidance in accomplishing this study and his interest and continuous valuable encouragement as well as for his sincere help and advice in chemical analysis and writing this thesis.

Deep appreciation and thanks are also to my sisters **Rolla Payerlly** and **Noha Eid**.

My deep thanks are also extended to the staff members and workers of Biotechnology Lab. for love and moral support .

Thanks also to the staff member and workers of the Plant Physiology Division ,Fac. of Agric.,Cairo Univ. for love and moral support .

My deep thanks ,my utmost heartfelt gratitude to my parents , my wife **Ehdaa** , my lovely daughter **Yara** as well as to my brothers , my sisters and to my uncle **Myhoob** .

My deep thanks to my country **SYRIA**.

CONTENTS

Introduction

Introduction

Bananas are one of the earliest crops cultivated by man and for the most part ,only clones derived from natural evolution are cultivated for food.The extensive work of Simmonds and Shepherd (1966) suggested that edible bananas evolved in the old world by several mechanisms from two wild species *Musa acuminata colla* and *Musa balbisiana.*

Bananas (*Musa* spp.) are important staple crops in tropical and sub-tropical countries providing a good source of carbohydrates, minerals and vitamins. The banana trade also creates a considerable income as a cash crop. Banana used for fresh consumption ,bread , starch industries and drinkes. In Egypt banana importance refer to fresh cosumption as a popular fruit liked by people and cosidered the second people fruit follow in citrus , so banana production occupies an important share in the total fruit production of Egypt and many other countries especially middle of Africa and east south of Asia .

In Egypt banana area reached 48425 feddans and the total production was 655570 ton with an average of about 16.20 ton per feddan (Ministry of Agric., A.R.E., 1998) .

In the genus *Musa,* conventional breeding is limited by the high sterility and polyploidy. Mutation induction coupled with shoot tip culture are an effective system for the improvement of a modern cultivar. The treatment of multicellular structures leads to the formation of chimeras and several subcultures *in vitro* are necessary to dissolve chimeras. Mutation techniques, in principle, require the induction and screening of large plant populations, which can be very costly.

Moreover, *in vitro* propagated plants are increasingly becoming the planting material of choice because of disease control, uniformity and the possibilities of rapid multiplication of a valuable genotype. However, growers have to face higher costs than for suckers which restricts the potential use of *in vitro* culture.

Tissue culture micropropagation has become one of the most ways to reproduce crops that are difficult to propagate by conventional methods such as by seeds or cuttings . Micropropagation allows the production of large number of plants in a relatively small space or growing area and in a relatively shorter time . The speed of tissue culture technology development have been accelerated by its partical commercialization for many crops . Using shoot tip culture of banana has played a key role in the banana improvement .

In order to increase the efficiency of *in vitro* techniques, tissue culturists have made use of purified chemicals and sophisticated physical facilities whereby the temperature, humidity, lighting conditions and aeration are controlled. However, such expensive inputs may not be needed once the method for propagating a particular species has reached the 'recipe' stage.

It is so great importance to improve its total production by increasing banana area or by increasing the yield per feddan .

Cultivated bananas and plantains being parthenocarpic fruits, subsequent crops are usually produced from suckers of the mother plant. The use of vitroplants obtained by *in vitro* budding is one of the main improvements in the cultivation of banana during the last decade. Among crops cultivated on a large scale, banana is the most widely *in vitro*