EFFECT OF SOME AGRICULTURAL TREATMENTS ON ONION SEED PRODUCTION

By

SAMI HOSNI MAHMOUD IBRAHIM

B.Sc. Agric. Sc. (Horticulture), Cairo University, 1999

A thesis submitted in partial fulfillment

of

the requirements for the degree of

MASTER OF SCIENCE
in
Agricultural Science
(Vegetable Crops)

Department of Horticulture

Faculty of Agriculture

Ain Shams University

2011

Approval Sheet

EFFECT OF SOME AGRICULTURAL TREATMENTS ON ONION SEED PRODUCTION

By

SAMI HOSNI MAHMOUD IBRAHIM

B.Sc. Agric. Sc. (Horticulture), Cairo University, 1999

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

Dr. Mohamed Abd El-Latif El-Shaal ……..……...

Prof. Emeritus of Vegetable Crops, Faculty of Agriculture Alexandria University.

Dr. Ibrahim Ibrahim El-Oksh ……..……...

Prof. Emeritus of Vegetable Crops, Faculty of Agriculture Ain Shams University.

Dr. Mohamed Mohamed Soliman ….…….....

Associate Prof. of Vegetable Crops, Faculty of Agriculture Ain Shams University.

Dr. Mohamed Emam Ragab ……..…….....

Prof. of Vegetable Crops, Faculty of Agriculture Ain Shams University.

Date of Examination: 22 / 5 / 2011

EFFECT OF SOME AGRICULTURAL TREATMENTS ON ONION SEED PRODUCTION

By

SAMI HOSNI MAHMOUD IBRAHIM

B.Sc. Agric. Sc. (Horticulture), Cairo University, 1999

Under the supervision of:

Dr. Mohamed Emam Ragab

Prof. of Vegetable Crops, Department of Horticulture, Faculty of Agriculture, Ain Shams University (Principal Supervisor).

Dr. Mohamed Mohamed Soliman

Associate Prof. of Vegetable Crops, Department of Horticulture, Faculty of Agriculture, Ain Shams University.

Dr. Fatma Ahmed Mohamed Rizk

Research Prof. of Vegetable Crops, Department of Vegetable Crops, National Research Center.

تأثير بعض المعاملات الزراعية على إنتاج بذور البصل

رسالة مقدمة من

سامي حسني محمود إبراهيم
بكالوريوس علوم زراعية (بساتين) ، جامعة القاهرة ، 1999

للحصول على

درجة الماجستير في العلوم الزراعية
(خضـــر)

قســـم البساتيـن
كليـة الزراعـة
جامعة عين شمس

2011

صفحة الموافقة على الرسالة

تأثير بعض المعاملات الزراعية على إنتاج بذور البصل

رسالة مقدمة من

سامى حسنى محمود إبراهيم
بكالوريوس علوم زراعية (بساتين)، جامعة القاهرة، 1999

للحصول على
درجة الماجستير في العلوم الزراعية
(خضر)

وقد تمت مناقشة الرسالة والموافقة عليها

اللجنة

د. محمد عبد اللطيف الشال .....
أستاذ الخضر غير المتفرغ، كلية الزراعة، جامعة الاسكندرية

د. ابراهيم ابراهيم العكش .....
أستاذ الخضر غير المتفرغ، كلية الزراعة، جامعة عين شمس

د. محمد محمد سليمان .....
أستاذ الخضر المساعد، كلية الزراعة، جامعة عين شمس

د. محمد إمام رجب .....
أستاذ الخضر، كلية الزراعة، جامعة عين شمس

تاريخ المناقشة : ٢٢ / ٥ / ٢٠١١

جامعة عين شمـــس
كليــة الزراعــة

رسالة ماجستــير

اسم الطالـب : سامي حسني محمود إبراهيم

عنوان الرسالة : تأثير بعض المعاملات الزراعية على إنتاج بـذور البصل

اسم الدرجـة : ماجستير في العلوم الزراعية (خضر)

لجنة الإشراف

د. محمد إمام رجب
أستاذ الخضر، قسم البساتين ، كلية الزراعة ، جامعة عين شمس (المشرف الرئيسي)

د. محمد محمد سليمان
أستاذ الخضر المساعد ، قسم البساتين ، كلية الزراعة ، جامعة عين شمس

د. فاطمة احمد محمد رزق
أستاذ باحث ، قسم بحوث الخضر ، المركز القومي للبحوث

تاريخ التسجيل 2008/2/11
الدراسات العليا

ختم الإجازة **أجيزت الرسالة بتاريخ**
٢٢ / ٥ /2011

موافقة مجلس الكلية **موافقة مجلس الجامعة**
/ /2011 / /2011

ABSTRACT

Sami Hosni Mahmoud Ibrahim: Effect of Some Agricultural Treatments on Onion Seed Production. Unpublished M.Sc Thesis, Department of Horticulture, Faculty of Agriculture, Ain Shams University, 2011.

Two field experiments were carried out during the two successive growth seasons of 2008/2009 and 2009/2010 at a private farm in Quesna (EL-Menofyia, governorate, Egypt) to study the effect of some treatments on the productivity of onion seeds (cv Giza 20).

First experiment: This experiment included 8 treatments which were the simple combination between two bulb sizes ,i.e. large (>6.0 - < 8.0 cm, diameter) and medium size (>4.0 - <6.0 cm, diameter) and spraying with three growth active substances, i.e. yeast (3 g/L), chitosan (5cm/L) and boric acid (300 ppm) in addition to tap water as a control.

Second experiment: This experiment included 9 treatments which were the simple interaction between 3 planting dates of mother bulb planting, i.e. early (1st of October), medium (15th of October) and late (30th of October) with three doses of NPK application ,i.e. low (60,30,30 unit / feddan), medium (90,45,45) and high (120,60,60).

The obtained results indicated that for planting onion bulbs for seed production, it is favorable to use bigger bulbs (>6 - <8 cm diameter) to obtain the significant vigorous plant growth (plant height, average number of tillers and leaves, fresh and dry weight of whole plant and its different organs). Using bigger mother bulbs for onion seed production resulted in the higher quality of stalks and umbels, i.e. the higher stalk length which carried more number and diameter of stalks as well as bigger diameter and flowers of umbel. The weight of onion seeds recorded its significant superiority when large mother bulbs (6-8 cm diameter) were grown compared to that obtained by growing medium mother bulbs. Foliar spray of onion plants by yeast at 3 g /L. or chitosan at 5 cm/L. (three sprays with 15- day intervals) gave the significant plant vigor

characteristics. The application of yeast recorded the best values of stalk height, number and diameter, as well as the average number of flowers / umbel and umbel diameter. The foliar spray with yeast extract resulted in the heaviest seed weight, followed by chitosan application with no significant difference, and lastly by plants received boric acid. The obtained data showed that the 3 active substances caused an increase in germination percentages if compared to the control treatments.

The tallest plants which carried the largest leaves, highest tiller number and the heaviest dry and fresh weight of whole plant and its organs were associated with planting on 30th of October. The highest significant values of stalk length, number and diameter and umbel characters were recorded with plants planted on 30th of October. Delaying dates of onion planting up to the end of October caused an enhancement in seed yield weight and its germination. The highest values of plant height, average number of tillers and leaves per plant as well as the heaviest fresh and dry weight of plants, were obtained when plants received NPK at high rate (120:60:60). This rate increased also the flower number per umbel, seed weight as well as weight of 1000 seeds.

ACKNOWLEDGEMENT

Praise and thanks to **Allah**, the most merciful for directing me to the right way and provides me all I have.

Very special thanks to **Prof. Dr. Mohamed Emam Ragab**, Professor of Vegetable, Department of Horticulture, Faculty of Agriculture, Ain Shams University, for his kind supervision, valuable guidance, continuous help and true assistance during the preparation of this manuscript.

Deepest and sincere gratitude and appreciation to **Prof. Dr. Mohamed Mohamed Soliman**, Associate Professor of Vegetable, Department of Horticulture, Faculty of Agriculture, Ain Shams University, for his kind supervision, valuable assistance, moral and faithful attitude during the preparation of this manuscript.

Sincere and deep gratitude to **Prof. Dr. Fatma Ahmed Mohamed Rizk**, Professor of Vegetable Crops, National Research Centre, for her kind supervision, encouragement, and valuable helping throughout this study.

My deeply thanks to **Prof. Dr. Nadia Mahmoud Omar,** Professor of Vegetable Crops, National Research Centre, for her help during this work.

Very special thanks to **Prof. Dr. Abd El-Moaty Mohamed Shaheen,** Professor of Vegetable Crops, National Research Centre, for his generous help, great efforts and fruitful advice during the period of this work.

My grateful thanks to all staff members of Vegetable Research Dept., National Research Centre and my uncle Mr. Soliman Abd El-Fatah farm owner for their kind help and available facilities granted during this work.

My heart full thanks and sincere appreciation to my family specially my mother, wife and sons for their helpful support and encouragement all over my studying carrier.

CONTENTS

LIST OF TABLES

1- INTRODUTION

Onion is one of the most important vegetable crops for local consumption and export. The total planted area in Egypt for onion seed production is 2752 fed. produced 742 tons with an average of 270 kg/fed. according to the **Egyptian Ministry of Agricultural (2008).** Through the increase and improve of seed production technology both the yield and quality can be improved.

Significant differences were observed in seed yields since it depends on genotype, locality, season, as well as methods of production (**Brewster, 1994**).

In Egypt, the bulb is the used method for seed production, where mother bulbs are replanted in the autumn or early winter. However, temperature prevailing at various growing periods may have differential effects on flowering of cv Giza 20 onion, adapted for Egyptian cultivation. Therefore, testing such effect throughout different planting dates seems to be needed.

Bulb size, planting time, plant growth activation substances and NPk fertilizer rates can play an important role in seed production; whereas bulb size influences the plant growth and seed yield as well as, the splitting of bulb (**Baloch *et al*., 1998**).

The present investigation was, therefore, undertaken to find out the optimum size of mother bulb, the optimum rate of NPK application and planting time needed to achieve the best possible growth and seed yield of onion by using some growth activation substances under the existing agro-climatic conditions of Egypt.

2-REVIEW OF LITERATURE

In order to have a wide view on the influences of some agricultural treatments on onion seed production, the review of literature will be sub divided into the following items:

2.1. Effect of bulb size on plant growth, stalks and umbel as well as seed yield and its quality.

2.2. Effect of some growth activation substances, i.e. yeast, chitosan and boric acid, on plant growth, stalks and umbel as well as seed yield and its quality.

2.3. Effect of planting dates on plant growth, stalks and umbel as well as seed yield and its quality.

2.4. Effect of NPK on plant growth, stalks and umbel as well as seed yield and its quality.

2.1. Effect of bulb size:

2.1.1. Plant growth:

Larger-sized bulbs produced the highest number of leaves, while the small sizes produced the least number of leaves. The increase in the number of leaves is directly related to the number of tillers. **Gill *et al.* (1989)** conducted an experiment on 4 grades of onion bulb viz. A (>6 cm diameter), B (>5 and 6 cm diameter), C (<5 cm diameter) and O (un graded). They stated that the grade A bulbs gave the highest values for plant height, number of leaves per plant and number of tillers per plant compared to other grades. **Farghaly and Farag (1990)** evaluated the effects of three bulb sizes, i.e., large (>6cm), medium (4.5- 6 cm) and small (3.0 – 4.5 cm), and found that the large bulb sizes recorded the highest number of leaves and tillers per plant. Also, **Ibrahim *et al.* 1990** observed that the mother bulbs more than 5 cm (Giza 20) increased the number of leaves and tillers per plant. **Verma *et al.* (1994)** planted bulbs of onion cv. Brown Spanish with different weights (156.42, 98.18, 50.83, 25.92 g). The number of tillers per plant and average number of leaves per plant increased linearly with increasing bulb weight. **Ambulkar *et al.***