

ABSTRACT

This work was carried out during two winter seasons of 2000/2001 and 2001/2002 at El-Khattara, Experimental Farm, Fac. Agric., Zagazig University, to study the effect of plant density (2, 4, 6, 8 plants around dripper), foliar spray with salicylic acid (0, 100, 200 ppm), boron (0, 35, 70 ppm) and copper (0, 50, 100 ppm) on growth, plant chemical composition, yield and its components, bulb quality and storability of onion under sandy soil conditions.

Spraying onion plants with salicylic acid at 100 ppm were significantly increased dry weight of bulb, total, marketable and pickles yield/ fed and average bulb weight. Moreover, spraying onion plants with 100 or 200 ppm were significantly decreased weight loss percentage in bulbs during storage period. Low plant density of onion (two plants around dripper) gave the highest values of dry weight of bulb, whereas high plant density eight plants around dripper gave the highest plant height and total, marketable and pickles yield/ fed and the lowest sprouting percentage in bulbs during storage period. The interaction between salicylic acid at 200 ppm and plant density at eight plant around dripper gave the total and marketable yield/ fed. The interaction between salicylic acid at 100 or 200 ppm and plant density at six or eight plants around dripper recorded minimum sprouting percentage in bulbs during storage.

Spraying onion plants with boron at 35 ppm recorded minimum values of sprouting percentage in bulbs during storage period. Spraying onion plants with copper at 50 ppm recorded minimum sprouting percentage of bulbs during storage, whereas copper at 50 or 100 recorded maximum total and marketable yield/ fed compared with the control. The interaction between boron and copper at different rates of each recorded maximum values of average bulb weight and total and marketable yield/ fed, whereas recorded minimum sprouting percentage in bulbs during storage period. The interaction between boron at 70 ppm and copper at 100 ppm recorded minimum values of weight loss percentage in bulbs during storage period.

الموجز

أجرى هذا العمل خلال موسمين شتويين متتاليين للأعوام ٢٠٠٠ / ٢٠٠١، ٢٠٠١ / ٢٠٠٢ بمزرعة التجارب الزراعية بالخطارة والتابعة لكلية الزراعة جامعة الزقازيق لدراسة تأثير الكثافة النباتية (٢، ٤، ٦، ٨ نباتات حول النقاط) والرش بحمض السالسيك (صفر و ١٠٠ و ٢٠٠ جزء في المليون) والبيورون (صفر و ٣٥ و ٧٠ جزء في المليون) والنحاس (صفر و ٥٠ و ١٠٠ جزء في المليون) على النمو، التحليل الكيماوى للنبات، المحصول، جودة الأبصال، والقدرة التخزينية للبصل تحت ظروف الاراضى الرملية.

أدى رش نباتات البصل بمحلول حمض السالسيك بمعدل ١٠٠ جزء في المليون إلى زيادة الوزن الغض والجاف للأبصال، والمحصول الكلى والقابل للتسويق ومحصول النفضة وكذلك متوسط وزن البصلة، كذلك أدى رش نباتات البصل بمحلول حمض السالسيك بمعدل ١٠٠ أو ٢٠٠ جزء في المليون إلى نقص النسبة المئوية للفقد في الوزن للأبصال أثناء مدة التخزين. أعطت زراعة البصل بمعدل ٢ نبات حول النقاط أعلى القيم للوزن الجاف للأبصال، بينما أعطت زراعة البصل بمعدل ٨ نباتات حول النقاط أعلى محصول كلى وقابل للتسويق وأقل نسبة تزرير في الأبصال أثناء فترة التخزين. أدت معاملة التفاعل بين رش نباتات البصل بمحلول حمض السالسيك بمعدل ١٠٠ جزء في المليون وزراعتها بمعدل ٨ نباتات حول النقاط إلى زيادة المحصول الكلى والقابل للتسويق. كذلك أدت معاملة التفاعل بين رش نباتات البصل بمحلول حمض السالسيك بمعدل ١٠٠ أو ٢٠٠ جزء في المليون وزراعتها بمعدل ٦ أو ٨ نباتات حول النقاط إلى انخفاض نسبة التزرير للأبصال أثناء فترة التخزين.

سجلت معاملة رش نباتات البصل بالبيورون بمعدل ٣٥ جزء في المليون أقل القيم بالنسبة لنسبة التزرير للأبصال أثناء التخزين. سجلت معاملة رش نباتات البصل بالنحاس بمعدل ٥٠ جزء في المليون أقل نسبة تزرير للأبصال أثناء مدة التخزين، بينما سجلت معاملة الرش بالنحاس بتركيزات ٥٠ أو ١٠٠ جزء في المليون أعلى القيم لكل من المحصول الكلى والقابل للتسويق بالمقارنة بالكنترول. سجلت معاملة التفاعل بين الرش بالبيورون والنحاس بالتركيزات المختلفة لكل منهما أعلى القيم لكل من متوسط وزن البصلة والمحصول الكلى والقابل للتسويق، بينما سجلت أقل القيم نسبة لنسبة التزرير للأبصال أثناء التخزين. سجلت معاملة التفاعل بين الرش بالبيورون بتركيز ٧٠ جزء في المليون والنحاس بتركيز ١٠٠ جزء في المليون سجلت أقل نسبة للفقد في الوزن أثناء فترة التخزين.

CONTENTS

| Chapter | Page |
|--|------|
| I INTRODUCTION | 1 |
| II REVIEW OF LITERATURE | 3 |
| III MATERIALS AND METHODS | 17 |
| IV RESULTS AND DISCUSSION | 23 |
| 4.1. First experiment: Effect of foliar spray with salicylic acid (SA) , plant density and their interactions on growth, plant chemical composition ,yield and its components and storability of onion under sandy soil conditions. | 23 |
| 4.1.1 Plant Growth | 23 |
| 4.1.1.1 Morphological characters | 23 |
| a. Effect of salicylic acid..... | 23 |
| b. Effect of plant density ----- | 23 |
| c. Effect of interaction (salicylic acid x plant density) | 25 |
| 4.1.1.2 Fresh weight | 25 |
| a. Effect of salicylic acid..... | 25 |
| b. Effect of plant density ----- | 28 |
| c. Effect of interaction (salicylic acid x plant density) | 28 |
| 4.1.1.3 Dry weight | 28 |
| a. Effect of salicylic acid..... | 28 |
| b. Effect of plant density ----- | 32 |
| c. Effect of interaction (salicylic acid x plant density) | 32 |
| 4.1.2. leaf pigments | 34 |
| a. Effect of salicylic acid..... | 34 |
| b. Effect of plant density ----- | 34 |
| c. Effect of interaction (salicylic acid x plant density) | 36 |
| 4.1.3 Plant chemical composition | 36 |
| 4.1.3.1 Nitrogen , phosphorus and potassium content | 36 |
| a. Effect of salicylic acid..... | 36 |
| b. Effect of plant density ----- | 39 |
| c. Effect of interaction (salicylic acid x plant density) . | 39 |
| 4.1.3.2 Nitrogen , phosphorus and potassium uptake | 41 |
| a. Effect of salicylic acid..... | 41 |
| b. Effect of plant density ----- | 41 |
| c. Effect of interaction (salicylic acid x plant density) | 43 |
| 4.1.4 Yield and its components | 43 |
| a. Effect of salicylic acid) | 43 |
| b. Effect of plant density ----- | 48 |

| | |
|--|----|
| c. Effect of interaction (salicylic acid x plant density) | 49 |
| 4.1.5 Bulb quality at harvest and during storage | 51 |
| a. Effect of salicylic acid..... | 51 |
| b. Effect of plant density | 51 |
| c. Effect of interaction (salicylic acid x plant density) | 53 |
| 4.1.6 Storability | 53 |
| 4.1.6.1 Weight loss percentage | 53 |
| a. Effect of salicylic acid..... | 53 |
| b. Effect of plant density | 57 |
| c. Effect of interaction (salicylic acid x plant density) | 57 |
| 4.1.6.2 Sprouting percentage | 57 |
| a. Effect of salicylic acid..... | 57 |
| b. Effect of plant density | 61 |
| c. Effect of interaction (salicylic acid x plant density) | 61 |
| 4.2 Second Experiment : Effect of foliar spray with boron, copper and their interactions on growth , plant chemical composition, yield and its components and storability of onion under sandy soil conditions. | 63 |
| 4.2.1 Plant Growth | 63 |
| 4.2.1.1 Morphological Characters | 63 |
| a. Effect of boron..... | 63 |
| b. Effect of copper..... | 63 |
| c. Effect of interaction between (boron and copper) | 63 |
| 4.2.1.2 Fresh Weight | 66 |
| a. Effect of boron..... | 66 |
| b. Effect of copper..... | 66 |
| c. Effect of interaction between (boron and copper) | 66 |
| 4.2.1.3 Dry Weight | 66 |
| a. Effect of boron..... | 66 |
| b. Effect of copper..... | 71 |
| c. Effect of interaction between (boron and copper) | 71 |
| 4.2.2 leaf Pigments | 73 |
| a. Effect of boron..... | 73 |
| b. Effect of copper..... | 73 |
| c. Effect of interaction between (boron and copper) | 73 |
| 4.2.3 Plant chemical composition | 76 |
| 4.2.3.1 Nitrogen, phosphorus and potassium content | 76 |
| a. Effect of boron | 76 |

| | |
|---|-----|
| b. Effect of copper..... | 76 |
| c. Effect of interaction between (boron and copper) | 76 |
| 4.2.3.2 Nitrogen, phosphorus and potassium uptake | 79 |
| a. Effect of boron..... | 79 |
| b. Effect of copper..... | 79 |
| c. Effect of interaction between (boron and copper) | 79 |
| 4.2.4 Yield and its components | 83 |
| a. Effect of boron..... | 83 |
| b. Effect of copper..... | 83 |
| c. Effect of interaction between (boron and copper) | 86 |
| 4.2.5 Bulb quality at harvest and during storage | 86 |
| a. Effect of boron..... | 86 |
| b. Effect of copper..... | 89 |
| c. Effect of interaction between (boron and copper) | 89 |
| 4.2.6 Storability | 89 |
| 4.2.6.1 Weight loss percentage | 89 |
| a. Effect of boron..... | 89 |
| b. Effect of copper..... | 93 |
| c. Effect of interaction between (boron and copper) | 93 |
| 4.2.6.2 Sprouting percentage | 95 |
| a. Effect of boron..... | 95 |
| b. Effect of copper..... | 95 |
| c. Effect of interaction between (boron and copper) | 98 |
| V SUMMARY AND CONCLUSION | 100 |
| VI LITERATURE CITED | 107 |
| ARABIC SUMMARY | 1-6 |

ABBREVIATIONS

| | |
|------|---|
| cv | : Cultivar |
| cvs | : Cultivars |
| DW | : Dry weight |
| Ec | : Electric conductivity |
| Fed | : Feddan (4200m ²) |
| Fig | : Figure |
| FW | : Fresh weight |
| FYM | : Farmyard manure |
| gm | Gram |
| Ha | : Hectar (10000 m ²) |
| mg | Mili- gram |
| pH | : Minus logarithm base 10 , of H ⁺ concentration |
| ppm | : Part per million |
| R. H | : Relative humidity |
| Ton | : 1000 kg |
| TSS | : Total soluble solids |
| q | : 100 kg |