

**EFFECT OF SOME CULTURAL PRACTICES AND
CONTROL OF THRIPS AND LEAFHOPPER ON
FRUIT QUALITY OF SUPERIOR GRAPEVINE
CULTIVAR**

By

MAALY EASA ABDALLA WAFY

B.Sc. Agric. Sci. (Pomolgy), Fac. Agric., Cairo Univ., Egypt, 2003.

THESIS

**Submitted in Partial Fulfillment of the
Requirements for the Degree of**

MASTER OF SCIENCE

In

**Agricultural Sciences
(Pomology)**

**Department of Pomology
Faculty of Agriculture
Cairo University
EGYPT**

2009

APPROVAL SHEET

EFFECT OF SOME CULTURAL PRACTICES AND CONTROL OF THRIPS AND LEAFHOPPER ON FRUIT QUALITY OF SUPERIOR GRAPEVINE CULTIVAR

**M.Sc. Thesis
In
Agri. Sci. (Pomology)**

By

MAALY EASA ABDALLA WAFY
B.Sc. Agric. Sci. (Pomology), Fac. Agric., Cairo Univ., Egypt, 2003.

Approval Committee

Dr. ASSEM DESOKY SHALTOUT
Professor of Horticulture, Fac. Agric., Ain Shams University.

Dr. MOHAMED REDA BARAKAT
Professor of Pomology, Fac. Agric., Cairo University.

Dr. AHMED TAWFIK SALEM
Professor of Pomology, Fac. Agric., Cairo University.

Dr. ESSAM ABD EL-MAGUIED AGAMY
Professor of Entomology, Fac. Agric., Cairo University.

Date: 3 / 11/ 2009

SUPERVISION SHEET

EFFECT OF SOME CULTURAL PRACTICES AND CONTROL OF THRIPS AND LEAFHOPPER ON FRUIT QUALITY OF SUPERIOR GRAPEVINE CULTIVAR

M.Sc. Thesis

In

Agri. Sci. (Pomology)

By

MAALY EASA ABDALLA WAFY

B.Sc. Agric. Sci. (Pomology), Fac. Agric., Cairo Univ., Egypt, 2003.

SUPERVISION COMMITTEE

Dr. AHMED TAWFIK SALEM

Professor of pomology, Fac. Agric., Cairo University.

Dr. ESSAM ABD EL-MAGUIED AGAMY

Professor of Entomology, Fac. Agric., Cairo University.

Dr. IMAN IBRAHIM EL-SEBAEY

**Professor of Entomology, Plant Protection Research Institute
Agriculture Research Center**

DEDICATION

I dedicate this work to whom my heart felt thanks; to my mother and my father their patience and help, as well as to my brother Sameh, hasband Ahmed , daughter Maryam and all my ferriends for all the support they lovely offered along the period of my post graduation.

ACKNOWLEDGEMENT

I wish to express my sincere thanks, deepest gratitude and appreciation to Dr. Ahmed Tawfik Salem Professors of Pomolgy, Faculty of Agriculture, Cairo University, for effective supervision, guidance and interest promotion this work and for his kind help and supplying materials in order to complement this work in his own vineyard.

And gratitude are also extended to Dr. Essam Abd El-Maguied Agamy Professors of Entomology, Faculty of Agriculture, Cairo University for suggesting the problem, supervision, continued assistance and their guidance through the course of study and revision the manuscript of this thesis.

Also, I wish to express my special thanks and deep gratitude to Dr. Iman Ibrahim El-Sebaey, Professor of Entomology, Plant Protection Research Institute Agriculture Research Center for sharing in supervision.

Grateful appreciation is also extended to Dr. Mohamed Mohamed Abo- Setta, Professor of Entomology, Plant Protection Research Institute Agriculture Research Center

Name of Candidate: Maaly Easa AbdAllah Wafy **Degree:** M.Sc.
Title of Thesis: Effect of some cultural practices and control of thrips and leafhopper on fruit quality of Superior grapevine cultivar
Supervisors: Dr. Ahmed Tawfik Salem
Dr. Essam Abdel-Maguied Agamy
Dr. Iman Ibrahim El-sebaey
Department: Pomology
Branch: Pomology **Approval:** 3/ ١١/ 2009

ABSTRACT

This work was carried out in 2005 and 2006 season on Superior grapevine grown in sandy soil under drip irrigation system in a private orchard to investigate the effect of some culture practices (shoot orientation with and/ or without basal leaf removal, BLR) on bud behavior, berry set, yield and fruit quality beside the percent of thrips clusters infestation as well as the response of vines to some chemical agents, i.e paraffin oil, mineral oil, neem oil and dimethoate separatly or in combination, on population of leafhopper and thrips insects.

The results indicted that shoot orientation with BLR was superior in increasing bud burst percentage, berry set and yield/ vine. In addition, such treatment recorded the highest berry weight which in turn produced the heaviest clusters. Berry SSC was increased by treatment which produce fully sun light facing clusters where the treatment of shoot orientation with BLR produced the highest berry SSC followed by shoot orientation without BLR while control treatment gave the lowest value, nearly reverse trend was found with respect berry TA as shoot orientation with BLR seemed to produce berries with somewhat lower acidity. shoot orientation with BLR partically in the 2nd season markedly reduced the percentage of cluster infestation with thrips insect.

The best treatment in reducing thrips populations was mineral oil + dimethoate at 3000 ppm espically in 2nd seasons and leafhopper in both seasons. The highest thrips population was obtained at the period from berry set up to berry softening stage in both seasons while, the population reached the minimum size in the period from bud burst up to flowering and final leaf drop stages in the 1st and 2nd seasons respectively. The highest leafhopper population was recorded at the period from post harvest up to summer pruning stage in both seasons while, the period from bud burst to flowering stage recorded the lowest number of leafhopper population in both seasons.

Keywords: grapevine, superior, cultural practies, leafhopper, thrips

اسم الطالب: معالى عيسى عبدالله وافي
عنوان الرسالة: بعض المعاملات البستانية و مكافحة التبرس ونطاطات الأوراق على صفات الجودة فى العنب صنف سوبيريور

المشرفون : دكتور : أحمد توفيق سالم
دكتور : عصام عبدالمجيد عجمي
دكتور : إيمان إبراهيم السباعي

قسم: الفاكهة فرع: الفاكهة تاريخ منح الدرجة: 2009/11/ 3

المستخلص العربي

أجريت هذه الدراسة خلال موسمى 2005 و 2006 على كرمات العنب صنف سوبيريور المزروع فى أرض رملية ونامية تحت ظروف الرى بالتنقيط فى مزرعة خاصة لتقدير تأثير بعض المعاملات البستانية (توجيه الأفرع مع أو بدون إزالة الأوراق القاعدية) على سلوك البراعم وعقد الثمار والمحصول وجودة الثمار ونسبة إصابة العناقيد بالتبرس وكذلك إستجابة الكرمات لبعض المواد الكيماوية مثل زيت البرافين والزيت المعدنى وزيت النيم و الدايموثيت منفردة أو مخلوطة على حشرتى التبرس ونطاطات الأوراق.

وقد أظهرت النتائج أن معاملة توجيه الأفرع مع إزالة الأوراق القاعدية كانت أفضل المعاملات فى زيادة نسبة تفتح البراعم وعقد الثمار والمحصول للكرمة . أيضاً سجلت هذه المعاملة أعلى وزن للعنقود حيث أنتجت أثقل العناقيد وزناً . زاد محتوى الحبات من المواد الصلبة الذائبة الكلية فى المعاملات التى تعرض فيها العنقود للإضاءة الكاملة حيث سجلت معاملة توجيه الأفرع مع إزالة الأوراق القاعدية أعلى نسبة للمواد الصلبة الذائبة الكلية يليها معاملة توجيه الأفرع بدون إزالة الأوراق القاعدية ثم الكنترول . وعلى العكس تقريباً بالنسبة للحموضة الكلية فقد أنتجت معاملة توجيه الأفرع مع إزالة الأوراق القاعدية أقل حموضة فى الحبات . أظهرت النتائج أن أقل نسبة إصابة للعنقود بحشرة التبرس قد تحققت فى معاملة توجيه الأفرع مع إزالة الأوراق القاعدية.

كانت أفضل معاملة فى خفض تعداد التبرس هى الزيت المعدنى + الدايموثيت 3000 جزء فى المليون خاصة فى الموسم الثانى كما خفضت تعداد نطاطات الأوراق فى كلا الموسمين . شهدت الفترة من العقد إلى ليونة الثمار أعلى تعداد للتبرس فى كلا الموسمين بينما كان التعداد منخفض فى الفترة من تفتح البراعم إلى التزهير و فى مرحلة التساقط النهائى للأوراق فى الموسم الأول والثانى على التوالى . سجل أعلى تعداد لنطاطات الأوراق فى فترة ما بعد الحصاد إلى التقليم الصيفى فى كلا الموسمين بينما كان التعداد منخفض فى الفترة من تفتح البراعم إلى التزهير فى كلا الموسمين.

الكلمات الدالة : العنب ، سوبيريور ، المعاملات البستانية، نطاطات الأوراق ، التبرس

CONTENTS

	Page
INTRODUCTION.....	1
REVIEW OF LITERATURE.....	3
1. Effect of shoot orientation and leaf removal on grapevine	3
2. Effect of thrips and leafhopper on grapevine.....	14
3. Effect of chemical treatments on population of thrips and leafhopper.....	19
MATERIALS AND METHODS.....	29
RESULTS AND DISCUSSION.....	35
1. Horticulture study.....	35
a. Effect of shoot orientation and basal leaf removal on bud behavior and berry set percentage.....	35
1. Percentage of bud burst.....	35
2. Percentage of bud fertility.....	36
3. Percentage of berry set	38
b. Effect of shoot orientation and basal leaf removal (BLR) on yield and fruit quality.....	39
1. Yield.....	39
2. Fruit physical characteristics	40
a.Cluster weight.....	40
b. Berry weight	41
c. Berry volume	42
d. Berry length and berry diameter.....	43
3. Fruit chemical characteristics.....	46
a. Berry soluble solids content.....	46
b.Total acidity.....	47
c. SSC/acid ratio.....	48
c. Effect of shoot orientation and basal leaf removal on clusters infestation.....	50
2. Entomological study.....	51

a. Effect of chemical treatments on population fluctuations of thrips and leafhopper.....	51
1. Thrips (<i>Thrips tabaci</i>).....	51
2. Leafhopper (<i>Empoasca decedens</i>).....	54
3. Population fluctuations of thrips and leafhopper in 2005 and 2006 seasons.....	55
b. Effect of grapevine growth stage on population fluctuations of thrips and leafhopper.....	56
1. Thrips.....	56
2. Leafhopper.....	59
SUMMARY	63
REFERENCES	67
ARABIC SUMMARY	

LISTT OF TABLES

No	Title	Page
1.	Effect of shoot orientation and basal leaf removal (BLR) on bud burst (%), bud fertility (%) and berry set (%) of Superior grapevine in 2005 and 2006 seasons.....	36
2.	Effect of shoot orientation and basal leaf removal (BLR) on yield and fruit physical characteristic of Superior grapevine in 2005 and 2006 seasons	45
3.	Effect of shoot orientation and basal leaf removal (BLR) on soluble solids content (SSC), Acidity (%) and SSC / Acid ratio of Superior grape berries in 2005 and 2006 season	49
4.	Effect of shoot orientation and basal leaf removal (BLR) on thrips cluster infestation of Superior grapevine.....	50
5.	Significant differences among the treatments on population of thrips in 2006-season	52
6.	Significant differences among the treatments on population of thrips in 2006-season.....	54
7.	Effect of chemical treatments on mean number of thrips and leafhopper in 2005 and 2006 seasons	56
8.	Significant differences among the growth stages of grapevine on population of thrips in 2005-season.....	57
9.	Significant differences among the growth stages of grapevine on population of thrips in 2006.....	58
10.	Significant differences among the growth stages of grapevine on population of leafhopper in 2005.....	60
11.	Significant differences among the growth stages of grapevine on population of leafhopper in 2006.....	61

LIST OF FIGURES

No	Title	Page
1.	Effect of shoot orientation and basal leaf removal (BLR) on bud burst of Superior grapevine in 2005 and 2006 seasons.....	36
2.	Effect of shoot orientation and basal leaf removal (BLR) on bud fertility of Superior grapevine in 2005 and 2006 seasons.....	37
3.	Effect of shoot orientation and basal leaf removal (BLR) on berry set of Superior grapevine in 2005 and 2006 seasons.....	39
4.	Effect of shoot orientation and basal leaf removal (BLR) on yield of Superior grapevine in 2005 and 2006 seasons.....	40
5.	Effect of shoot orientation and basal leaf removal (BLR) cluster weight of Superior grapevine in 2005 and 2006 seasons.....	41
6.	Effect of shoot orientation and basal leaf removal (BLR) on berry weight of Superior grapevine in 2005 and 2006 season	42
7.	Effect of shoot orientation and basal leaf removal (BLR) on berry volume of Superior grapevine in 2005 and 2006 seasons	43
8.	Effect of shoot orientation and basal leaf removal (BLR) on berry length of Superior grapevine in 2005 and 2006 seasons.....	44
9.	Effect of shoot orientation and basal leaf removal (BLR) on berry diameter of Superior grapevine in 2005 and 2006 seasons.....	44
10.	Effect of shoot orientation and basal leaf removal (BLR) on berry soluble solids content of Superior grapevine in 2005 and 2006 seasons	46

11.	Effect of shoot orientation and basal leaf removal (BLR) on berry acidity of Superior grapevine in 2005 and 2006 seasons.....	48
12.	Effect of shoot orientation and basal leaf removal (BLR) on SSC/acid ratio of Superior grapevine in 2005 and 2006 seasons.....	49
13.	Effect of shoot orientation and basal leaf removal (BLR) on thrips cluster infestation of Superior grapevine in 2005 and 2006 seasons.....	50
14.	Effect of chemical treatments on thrips population in 2005 and 2006 seasons.....	53
15.	Effect of chemical treatments on population of thrips in 2005 and 2006 seasons.....	55
16.	Population fluctuations of thrips and leafhopper in 2005 and 2006 season.....	56
17.	Effect of growth-stage on thrips population in 2005 and 2006.....	59
18.	Effect of growth stage on population of leafhopper in 2005 and 2006.....	62

INTRODUCTION

Table grapes are the most important deciduous fruit crop grown in Egypt where the total area devoted to production is 170.000 fed (FAO, 2007). Table grape are produced in northern and central region of Egypt. Approximately 50% of all planting area is presented in the northern region while the rest is distributed in other governorates. Moreover, grapes could be produced in Upper Egypt as well as Toshka and Shark-el-Ewinate as these areas provides wide climate range that makes it possible to harvest and export grapes earlier than the other mentioned regions. Anyhow, all these regions have high effective heat summation during the growing season with lack of winter chilling temperature, so hydrogen cyanamide is used to advance shoot growth and improve budbreak uniformity and maturation of the crop. Vineyards are planted in a wide range of soil types and water quality and availability range from fair to excellent. Superior, Flame seedless and Thompson seedless are the most important cultivars grown in these areas depending on region and cultivar harvest time stretched from mid May until the end of July.

Since late 1990s, an export industry developed for the early European market besides some at Arabian and African countries. In this regard cultivars which characterized as early maturity i.e. Superior has opportunity to increase its exportation quality to the foreign market. Therefore, to attain high fruit quality, new cultural and management practices, harvest and post harvest system as well as integrated pest control should be followed.

Some of these pests may cause serious economic injury to vineyard , especially piercing and sucking insects such as leafhopper which causes reducing in bud fruitfulness (Martinson *et al.*, 1997), feed by piercing the cells of leaves and removing the contents .The Extensive leafhopper feeding causes leaves to become chlorotic, thereby reducing photosynthesis rates or causing leaf drop , this damage can lower the sugar content of the fruit and reduce vigor of vines (Kirk *et al.*, 1998) and thrips which causes larger rectangular or circular patches on the leaves Strapazzon *et al*, (1986) , feed on surface of berries causing scarring(Ripa *et al.*, 1993) and feed in pollen and small berries, and the symptoms left were more visible after the development of the berries and were characterized by dark scars and suberized surface on berries, sometimes causing the berry to crack, and the seed to prolapse (Rogério *et al.*, 2002)

Using methods of control such as using of oils like mineral oil, neem oil, and Paraffin oil is more safety than other insecticides also, mixed of mineral oil with phosphoric (dimethoate) pesticides improve efficacy and decrease the toxicity effect of phosphoric pesticides.

Therefore, this study was conducted to evaluate:

- 1- The effect of some cultural practices on bud behavior, yield, fruit quality and infesting cluster by thrips.
- 2- The effect of chemical treatments to reduce populations of leafhopper (*Empoasca decedens* Paoli) and thrips (*Thrips tabaci* Lindeman) on grapevine during flowering and before leaf-fall stage.

REVIEW OF LITERATURE

1. Horticultural studies

a. Effect of leaf removal on grapevine

1. Effect on bud behavior

Studying the effect of leaf removal on bud behavior, showed that removing the lowermost 4-5 leaves on shoots had no significant effect on bud fertility in Riesling X Silvaner and Blauburgunder grapes compared with untreated controls (Koblet, 1987). Similar investigation was obtained by Percival *et al.* (1994) who showed that there was no influence of the leaf removal treatments on bud fertility in grapevines cv. Riesling.

While Melouk *et al.* (1999) reported that bud fertility decreased with increasing defoliation.

2. Effect on yield

It was found from previous studies that yield increased considerably with leaf removal. Hunter *et al.* (1995) reported that yield/vine increased considerably with defoliation at pea-size and veraison stage.

While, Koblet (1987) reported that yield had no significant response by defoliation. Similarly, Zoecklein *et al.* (1992) stated that fruit yield components were generally unaffected by leaf removal, Ezzahouani and Williams (2003) on Ruby Seedless grapevine observed that defoliation had no effect on yield, also, Main and Morris (2004) disclosed that leaf removal did not affect yield or yield components. In addition, Andrade *et al.* (2005) showed that defoliation had no significant effect on yield. Iannini *et al.* (2007) mentioned that