

**Effect of Gibberellic acid, Active dry yeast and  
Bunch trimming treatments on physical and  
chemical characteristics of Williams banana fruit.**

BY

**Ahmed Abd El-Hady Rashedy Hemeed**

B. SC. Horticulture Science, Faculty of Agriculture  
Cairo University

٢٠٠١

Thesis

Submitted in partial fulfillment of the requirement for the  
Degree of Master of Science

In

Agriculture Science

**(Pomology)**

Pomology Department

Faculty of Agriculture

Cairo University

٢٠٠٦

**Effect of Gibberellic acid, Active dry yeast and Bunch  
trimming treatments on physical and chemical  
characteristics of Williams banana fruit.**

BY

**Ahmed Abd El-Hady Rashedy Hemeed**

*B. SC. Horticulture Science, Faculty of Agriculture  
Cairo University, "*

**Thesis**

*Submitted in partial fulfillment of the requirement  
for the degree of master of Science*

**Supervision Committee:**

**Dr. Hussein Taher Mehanna**

*Professor of Pomology, Faculty of Agriculture,  
Cairo University*

**Dr. Ahmed Ali El-Ezaby**

*Assistant Professor of Pomology, Faculty of Agriculture,  
Cairo University*

## ACKNOWLEDGEMENT

The author wishes to express his deepest gratitude and appreciation to **Prof. Dr. Hussein Taher Mehanna**, Professor of Pomology, Fac. Agric. Cairo Univ. For suggesting the problem, keeping interest and encouragement throughout the whole work and sincere concern for supervising the study.

Sincere thanks and grateful appreciation to **prof. Dr. Ahmed Ali El-Ezaby**, Assistant professor of Pomology, Fac. Agric. Cairo Univ. for his helpful suggestion, valuable assistance which contributed greatly to this work.

Grateful appreciation and indebtedness are affined to **Dr. Mohamed Reda Barakat**, Professor of Pomology, Fac. Agric., Cairo Univ. for his valuable guidance and giving the facilities for the field investigation.

Sincere thanks to **all members of department**, who helped me in many ways to make this possible.

FIRST AND FOREVER ULTIMATE THANKS ARE  
DUE TO **ALLAH**, WHO WITHOUT HIS AID THIS  
WORK COULD BE NOT DONE.

TO MY DEARS  
**FAMILY AND FRIENDS**

تأثير المعاملة بكل من الجبرالين والخميرة الجافة النشطة وإزالة الكفوف على  
الصفات الطبيعية والكيميائية لثمار الموز الوليامز

رسالة مقدمة من

أحمد عبد الهادى رشيدى حميد

بكالوريوس فى العلوم الزراعية – بساتين الفاكهة (٢٠٠١)

كلية الزراعة – جامعة القاهرة

للحصول على درجة الماجستير

فى العلوم الزراعية – قسم بساتين الفاكهة

كلية الزراعة

جامعة القاهرة

٢٠٠٦

تأثير المعاملة بكل من الجبرالين والخميرة الجافة النشطة وإزالة الكفوف على الصفات  
الطبيعية والكيميائية لثمار الموز الوليامز

رسالة مقدمة من

**أحمد عبد الهادى رشيدى حميد**

بكالوريوس فى العلوم الزراعية – بساتين الفاكهة (٢٠٠١)

كلية الزراعة – جامعة القاهرة

للحصول على درجة الماجستير فى العلوم الزراعية

قسم بساتين الفاكهة كلية الزراعة جامعة القاهرة

لجنة الإشراف:

**د. أ.د. / حسين طاهر مهنا**

أستاذ الفاكهة – كلية الزراعة – جامعة القاهرة.

**د. أ.م. / أحمد على على العزبى**

أستاذ الفاكهة المساعد – كلية الزراعة – جامعة القاهرة.

# CONTENTS

Page

|                                                                 |  |
|-----------------------------------------------------------------|--|
| <b>INTRODUCTION .....</b>                                       |  |
| <b>REVIEW OF LITERATURE .....</b>                               |  |
| <b>MATERIALS AND METHODS .....</b>                              |  |
| <b>RESULTS AND DISCUSSION .....</b>                             |  |
| <b>١,١.Physical Characteristics.....</b>                        |  |
| <b>١,١,١.Bunch Weight.....</b>                                  |  |
| <b>١,١,٢. Fruit volume.....</b>                                 |  |
| <b>١,١,٣. Fruit Diameter .....</b>                              |  |
| <b>١,١,٤. Fruit Length.....</b>                                 |  |
| <b>١,١,٥. Fruit Pulp\Peel ratio.....</b>                        |  |
| <b>١,١,٦. Angulation Percent and Fruit Maturity.....</b>        |  |
| <b>١,٢. Chemical Characteristics.....</b>                       |  |
| <b>١,٢,١. Fruit Total Soluble Solids Content.....</b>           |  |
| <b>١,٢,٢. Fruit Total Sugars Content .....</b>                  |  |
| <b>١,٢,٣. Fruit Total Acidity Content.....</b>                  |  |
| <b>١,٢,٤. Fruit Total Chlorophyll and Carotene Content.....</b> |  |
| <b>SUMMARY AND CONCLUSION.....</b>                              |  |
| <b>LITERATURE CITED.....</b>                                    |  |
| <b>ARABIC SAMMARY.....</b>                                      |  |

## SUMMARY AND CONCLUSION

بسم الله الرحمن الرحيم

" قالوا سبحانك لا علم لنا إلا ما علمتنا

انك أنت العليم الحكيم"

صدق الله العظيم

**Table (1):** Effect of GA<sub>3</sub>, active dry yeast and bunch trimming treatments on bunch weight (kg / plant) of Williams banana cv. through two seasons (2003 and 2004).

| Treatments              | First season<br>2003 | Second season<br>2004 |
|-------------------------|----------------------|-----------------------|
| Control                 | 27,87                | 31,17                 |
| GA <sub>3</sub> 0.0 B   | 26,43                | 31,67                 |
| GA <sub>3</sub> 0.0 D   | 30,00                | 32,83                 |
| GA <sub>3</sub> 1.0 B   | 31,90*               | 33,00                 |
| GA <sub>3</sub> 1.0 D   | 29,10                | 33,17                 |
| GA <sub>3</sub> 2.0 B   | 28,43                | 32,92                 |
| GA <sub>3</sub> 2.0 D   | 28,03                | 33,33                 |
| GA <sub>3</sub> 1.0 R B | -                    | 32,42                 |
| GA <sub>3</sub> 1.0 R D | -                    | 32,08                 |
| Yeast 0.1% B            | 26,70                | 31,20                 |
| Yeast 0.1% D            | 26,30                | 32,17                 |
| Yeast 0.5% B            | 28,00                | 32,83                 |
| Yeast 0.5% D            | 26,10                | 31,17                 |
| Yeast 1% B              | 30,00                | 33,20                 |
| Yeast 1% D              | 31,63*               | 30,83                 |
| R                       | -                    | 34,08                 |
| R + 1 Hand              | -                    | 30,00*                |
| R + 2 Hand              | -                    | 30,00                 |
| Yeast 0.1% S.B          | -                    | 32,33                 |
| Yeast 0.5% S.B          | -                    | 31,42                 |
| Yeast 1% S.B            | -                    | 32,00                 |
| Yeast 0.1% S.H          | -                    | 33,20                 |
| Yeast 0.5% S.H          | -                    | 34,00*                |
| Yeast 1% S.H            | -                    | 31,42                 |
| L.S.D.                  | 3,396                | 3,207                 |

B Bunch sprayed once, at bunch emergence.

D Bunches sprayed twice, at bunch emergence and one month later.

S.B. Soil application four times (one week intervals) at bunch emergence.

S.H Soil application four times (one week intervals) one month before harvest.

R removal of male bud just after bunch emergence.

- Treatment did not carry out in the first season

\* Significant increase.

**Table (٢):** Effect of GA<sub>٣</sub>, active dry yeast and bunch trimming treatments on fruit weight (gm) of Williams banana cv. through two seasons (٢٠٠٣ and ٢٠٠٤).

| Treatments              | First season<br>٢٠٠٣ | Second season<br>٢٠٠٤ |
|-------------------------|----------------------|-----------------------|
| Control                 | ١٢٥,٣                | ١٠٨,٩                 |
| GA <sub>٣</sub> ٥٠ B    | ١٢٥,٩                | ١١٧,٧*                |
| GA <sub>٣</sub> ٥٠ D    | ١٣٢,٦*               | ١١٥,٧                 |
| GA <sub>٣</sub> ١٠٠ B   | ١٣٦,٩*               | ١٢١,٧*                |
| GA <sub>٣</sub> ١٠٠ D   | ١٢٣,٩                | ١١٢,٦                 |
| GA <sub>٣</sub> ٢٠٠ B   | ١٠٢,١                | ١١٥,٤                 |
| GA <sub>٣</sub> ٢٠٠ D   | ١١٢,٨                | ١١٠,٥                 |
| GA <sub>٣</sub> ١٠٠ R B | -                    | ١١٤,٣                 |
| GA <sub>٣</sub> ١٠٠ R D | -                    | ١٢٠,٣*                |
| Yeast ٠,١% B            | ١١٤,٥                | ١٠٧,٦                 |
| Yeast ٠,١% D            | ١٠٧,٧                | ٩٩,٤٨                 |
| Yeast ٠,٥% B            | ١١٣,٧                | ١٢١,٠*                |
| Yeast ٠,٥% D            | ١٠٩,٠                | ١٢٦,٠*                |
| Yeast ١% B              | ١١٤,٧                | ١٢٦,٣*                |
| Yeast ١% D              | ١١٧,٥                | ١١٠,٠                 |
| R                       | -                    | ١١٤,٦                 |
| R + ١ Hand              | -                    | ١٢٣,١*                |
| R + ٢ Hand              | -                    | ١٣٨,٤*                |
| Yeast ٠,١% S.B          | -                    | ١٢٢,٦*                |
| Yeast ٠,٥% S.B          | -                    | ١١٢,٣                 |
| Yeast ١% S.B            | -                    | ١٠٢,٨                 |
| Yeast ٠,١% S.H          | -                    | ١٣١,٠*                |
| Yeast ٠,٥% S.H          | -                    | ١٢٢,٦*                |
| Yeast ١% S.H            | -                    | ١٠٩,٥                 |
| L.S.D.                  | ٦,٨٢٤                | ٦,٨٢٥                 |

B Bunch sprayed once, at bunch emergence.

D Bunches sprayed twice, at bunch emergence and one month later.

S.B. Soil application four times (one week intervals) at bunch emergence.

S.H Soil application four times (one week intervals) one month before harvest.

R removal of male bud just after bunch emergence.

-Treatment did not carry out in the first season

\* significant increase.

**Table (٣):** Effect of GA<sub>٣</sub>, active dry yeast and bunch trimming treatments on fruit volume (cm<sup>٣</sup>) of Williams banana cv. through two seasons (٢٠٠٣ and ٢٠٠٤).

| Treatments              | First season<br>٢٠٠٣ | Second season<br>٢٠٠٤ |
|-------------------------|----------------------|-----------------------|
| Control                 | ١٢٧,٩                | ١١١,٧                 |
| GA <sub>٣</sub> ٥٠ B    | ١٢٨,٤                | ١٢٠,٧*                |
| GA <sub>٣</sub> ٥٠ D    | ١٣٥,٥*               | ١١٩,٣*                |
| GA <sub>٣</sub> ١٠٠ B   | ١٣٩,٧*               | ١٢٤,٢*                |
| GA <sub>٣</sub> ١٠٠ D   | ١٢٦,٨                | ١١٤,٠                 |
| GA <sub>٣</sub> ٢٠٠ B   | ١٠٤,٢                | ١١٧,٥                 |
| GA <sub>٣</sub> ٢٠٠ D   | ١١٤,٧                | ١١٢,٦                 |
| GA <sub>٣</sub> ١٠٠ R B | -                    | ١١٥,٩                 |
| GA <sub>٣</sub> ١٠٠ R D | -                    | ١٢٤,٥*                |
| Yeast ٠,١% B            | ١١٧,١                | ١١٠,٠                 |
| Yeast ٠,١% D            | ١١٠,٣                | ١٠٣,٥                 |
| Yeast ٠,٥% B            | ١١٦,٥                | ١٢٤,١*                |
| Yeast ٠,٥% D            | ١١١,٥                | ١٢٧,٧*                |
| Yeast ١% B              | ١١٧,٧                | ١٣٠,٠*                |
| Yeast ١% D              | ١٢٠,٧                | ١١٢,٦                 |
| R                       | -                    | ١١٥,٩                 |
| R + ١ Hand              | -                    | ١٢٦,٥*                |
| R + ٢ Hand              | -                    | ١٤٢,٣*                |
| Yeast ٠,١% S.B          | -                    | ١٢٥,٠*                |
| Yeast ٠,٥% S.B          | -                    | ١١٥,٢                 |
| Yeast ١% S.B            | -                    | ١٠٥,٥                 |
| Yeast ٠,١% S.H          | -                    | ١٣٤,٢*                |
| Yeast ٠,٥% S.H          | -                    | ١٢٥,٨*                |
| Yeast ١% S.H            | -                    | ١١٢,٧                 |
| L.S.D.                  | ٦,٧٨٩                | ٦,٦٧٠                 |

B Bunch sprayed once, at bunch emergence.

D Bunches sprayed twice, at bunch emergence and one month later.

S.B. Soil application four times (one week intervals) at bunch emergence.

S.H Soil application four times (one week intervals) one month before harvest.

R removal of male bud just after bunch emergence.

- Treatment did not carry out in the first season

\* significant increase.

**Table (9):**Effect of GA<sub>3</sub>, active dry yeast and bunch trimming treatments on fruit Length (cm) of Williams banana cv. through two seasons (2003 and 2004).

| Treatments              | FIRST SEASON<br>2003 | SECOND SEASON<br>2004 |
|-------------------------|----------------------|-----------------------|
| Control                 | 20,28                | 20,00                 |
| GA <sub>3</sub> 0.0 B   | 20,61                | 20,70 *               |
| GA <sub>3</sub> 0.0 D   | 21,20*               | 20,28                 |
| GA <sub>3</sub> 1.0 B   | 21,39*               | 20,84*                |
| GA <sub>3</sub> 1.0 D   | 20,44                | 20,77*                |
| GA <sub>3</sub> 2.0 B   | 19,14                | 20,39                 |
| GA <sub>3</sub> 2.0 D   | 18,72                | 20,92*                |
| GA <sub>3</sub> 1.0 R B | -                    | 19,83                 |
| GA <sub>3</sub> 1.0 R D | -                    | 21,14*                |
| Yeast 0.1% B            | 19,64                | 20,00                 |
| Yeast 0.1% D            | 19,61                | 19,28                 |
| Yeast 0.5% B            | 19,83                | 20,00                 |
| Yeast 0.5% D            | 19,08                | 20,70*                |
| Yeast 1% B              | 19,61                | 20,07                 |
| Yeast 1% D              | 20,36                | 20,00                 |
| R                       | -                    | 20,08                 |
| R + 1 Hand              | -                    | 20,67*                |
| R + 2 Hand              | -                    | 21,42*                |
| Yeast 0.1% S.B          | -                    | 20,67*                |
| Yeast 0.5% S.B          | -                    | 19,72                 |
| Yeast 1% S.B            | -                    | 19,61                 |
| Yeast 0.1% S.H          | -                    | 20,92*                |
| Yeast 0.5% S.H          | -                    | 20,61                 |
| Yeast 1% S.H            | -                    | 19,83                 |
| L.S.D.                  | 0,8821               | 0,6237                |

B Bunch sprayed once, at bunch emergence.

D Bunches sprayed twice, at bunch emergence and one month later.

S.B. Soil application four times (one week intervals) at bunch emergence.

S.H Soil application four times (one week intervals) one month before harvest.

R removal of male bud just after bunch emergence.

-Treatment did not carry out in the first season.

\* Significant increase.

**Table (4):** Effect of GA<sub>3</sub>, active dry yeast and bunch trimming treatments on fruit Diameter (cm) of Williams banana cv. through two seasons (2003 and 2004).

| Treatments              | First season<br>2003 | Second season<br>2004 |
|-------------------------|----------------------|-----------------------|
| Control                 | 3,63                 | 3,41                  |
| GA <sub>3</sub> 0.0 B   | 3,64                 | 3,03*                 |
| GA <sub>3</sub> 0.0 D   | 3,72*                | 3,34                  |
| GA <sub>3</sub> 1.0 B   | 3,68*                | 3,44                  |
| GA <sub>3</sub> 1.0 D   | 3,60                 | 3,42                  |
| GA <sub>3</sub> 2.0 B   | 3,06                 | 3,40                  |
| GA <sub>3</sub> 2.0 D   | 3,00                 | 3,34                  |
| GA <sub>3</sub> 1.0 R B | -                    | 3,40                  |
| GA <sub>3</sub> 1.0 R D | -                    | 3,46                  |
| Yeast 0.1% B            | 3,47                 | 3,27                  |
| Yeast 0.1% D            | 3,29                 | 3,22                  |
| Yeast 0.5% B            | 3,46                 | 3,49                  |
| Yeast 0.5% D            | 3,00                 | 3,00*                 |
| Yeast 1% B              | 3,47                 | 3,00*                 |
| Yeast 1% D              | 3,49                 | 3,30                  |
| R                       | -                    | 3,47                  |
| R+ 1 Hand               | -                    | 3,40                  |
| R + 2 Hand              | -                    | 3,66*                 |
| Yeast 0.1% S.B          | -                    | 3,43                  |
| Yeast 0.5% S.B          | -                    | 3,30                  |
| Yeast 1% S.B            | -                    | 3,29                  |
| Yeast 0.1% S.H          | -                    | 3,09*                 |
| Yeast 0.5% S.H          | -                    | 3,06*                 |
| Yeast 1% S.H            | -                    | 3,33                  |
| L.S.D.                  | 0.0329               | 0.0902                |

B Bunch sprayed once, at bunch emergence.

D Bunches sprayed twice, at bunch emergence and one month later.

S.B. Soil application four times (one week intervals) at bunch emergence.

S.H Soil application four times (one week intervals) one month before harvest.

R removal of male bud just after bunch emergence.

- Treatment did not carry out in the first season

\* Significant increase.

**Table (٦):** Effect of GA<sub>٣</sub>, active dry yeast and bunch trimming treatments on fruit pulp \ peel ratio of Williams banana cv. through two seasons (٢٠٠٣ and ٢٠٠٤).

| Treatments              | First season<br>٢٠٠٣ | Second season<br>٢٠٠٤ |
|-------------------------|----------------------|-----------------------|
| Control                 | ٢,٤٩                 | ١,٩٣                  |
| GA <sub>٣</sub> ٥٠ B    | ١,٨١                 | ١,٩٣                  |
| GA <sub>٣</sub> ٥٠ D    | ٢,٥٧                 | ١,٧٥                  |
| GA <sub>٣</sub> ١٠٠ B   | ١,٩١                 | ١,٩٥                  |
| GA <sub>٣</sub> ١٠٠ D   | ٢,٥٧                 | ١,٩٤                  |
| GA <sub>٣</sub> ٢٠٠ B   | ٢,٢٧                 | ٢,٠٠                  |
| GA <sub>٣</sub> ٢٠٠ D   | ٢,٣٥                 | ١,٧٩                  |
| GA <sub>٣</sub> ١٠٠ R B | -                    | ١,٩٠                  |
| GA <sub>٣</sub> ١٠٠ R D | -                    | ١,٧٧                  |
| Yeast ٠,١% B            | ١,٩٩                 | ١,٨٠                  |
| Yeast ٠,١% D            | ٢,٠٤                 | ١,٩٥                  |
| Yeast ٠,٥% B            | ٢,٣٢                 | ٢,٠٤                  |
| Yeast ٠,٥% D            | ٢,٥٥                 | ١,٧٦                  |
| Yeast ١% B              | ٢,٠٨                 | ١,٨٥                  |
| Yeast ١% D              | ١,٨٩                 | ١,٨٢                  |
| R                       | -                    | ١,٨٢                  |
| R + ١ Hand              | -                    | ٢,٠٠                  |
| R+ ٢ Hand               | -                    | ٢,٠٩                  |
| Yeast ٠,١% S.B          | -                    | ١,٩١                  |
| Yeast ٠,٥% S.B          | -                    | ١,٨٢                  |
| Yeast ١% S.B            | -                    | ١,٩٣                  |
| Yeast ٠,١% S.H          | -                    | ١,٧٨                  |
| Yeast ٠,٥% S.H          | -                    | ١,٨٧                  |
| Yeast ١% S.H            | -                    | ١,٨٤                  |
| L.S.D.                  | ٠,٣٤١٢               | ٠,١٨٠٠                |

B Bunch sprayed once, at bunch emergence.

D Bunches sprayed twice, at bunch emergence and one month later.

S.B. Soil application four times (one week intervals) at bunch emergence.

S.H Soil application four times (one week intervals) one month before harvest.

R removal of male bud just after bunch emergence.

- Treatment did not carry out in the first season