



EVALUATING **Immutines**

*At Experimental GREENHOUSE
ZUCCHINI*





Immutines in **Zucchini** Grown in **Soilless** **Experimental Design**

▫ **Zucchini crop grown under greenhouse**

- Cultivar of Zucchini: *Apus* (dark green)
- Substrate used: Bags of Coco Peat
- Date of planting: 13 December 2007
- Planting density: 1 plant per bag

▫ **Treatments evaluated**

1. Negative control
2. Immutines applied once as Drench (0.15%)
3. Immutines applied once as Drench (0.30%)
4. Immutines applied twice as Drench (0.30%) (6 weeks a part)
5. Immutines applied once as Foliar (1%)
6. Immutines applied twice as Foliar (1%) (6 weeks a part)

▫ **Experimental Design**

- CRBD
 - 4 Replicates per treatment
 - 1 Replicate = 5 plants

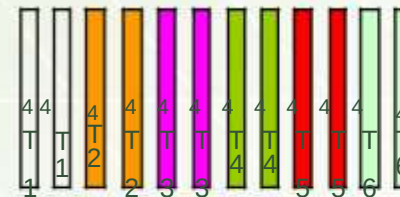
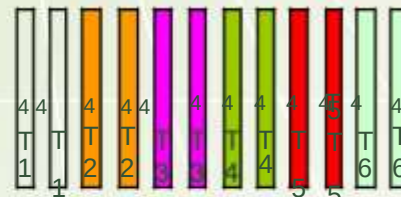
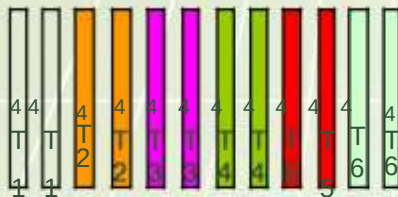
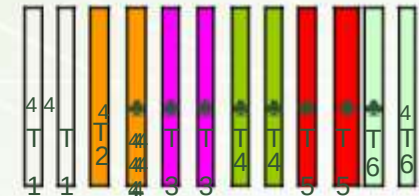
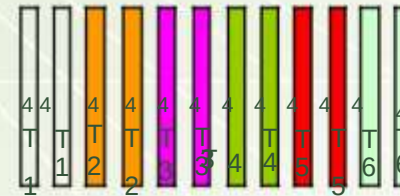
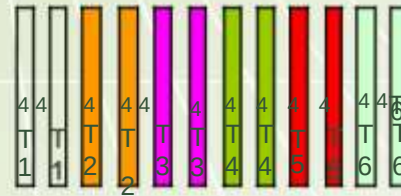
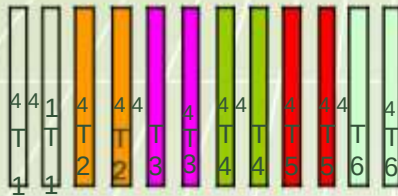
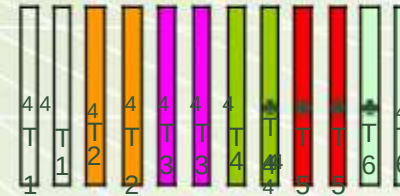
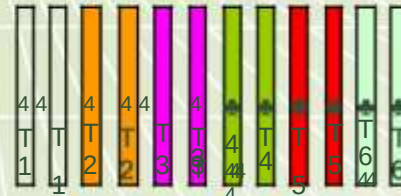
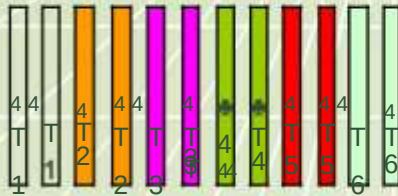
Immutines in **Zucchini** Grown in **Soilless** Experimental Design

B1

B2

B3

B4



Treatments evaluated

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Planting the Crop

Plantlets from Nursery Cal Agri Visit the Set Up





Preparing the two Greenhouses November 2007

Planting the Crops

Soilless Greenhouse

NEW Coco Peat Bags Soil Greenhouse





Planting the Crops

Soil Greenhouse
6 December 2008



Planting the Soilless
1 plant per coco peat bag





Planting the Crops

**Zucchini in Soilless
9 January 2008**

1 Replicate= 6 Plants 1 Treatment= 24 Plants





**Zucchini in Soilless
21 January 2008**

**Introduction of Bumble Bees for
Pollination**



**Zucchini in Soilless
25 January 2008**

**One hive of bumble bees every 6
weeks**



Zucchini in Soilless

25 January 2008

Bumble Bee in action



Bumble Bees Hive





Immutines in **Zucchini** Grown in **SOIL**

Experimental Design

Zucchini in Soilless
25 January 2008

▫ **Zucchini crop grown under greenhouse**

- Cultivar of Zucchini: *Apus* (Dark green)
- Date of planting: 28 November 2007
- Planting density: 1 plant per bag

▫ **Treatments evaluated**

1. Negative control
2. Immutines applied once as Drench (0.15%)
3. Immutines applied once as Drench (0.30%)
4. Immutines applied twice as Drench (0.30%) (6 weeks a part)
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▫ **Experimental Design**

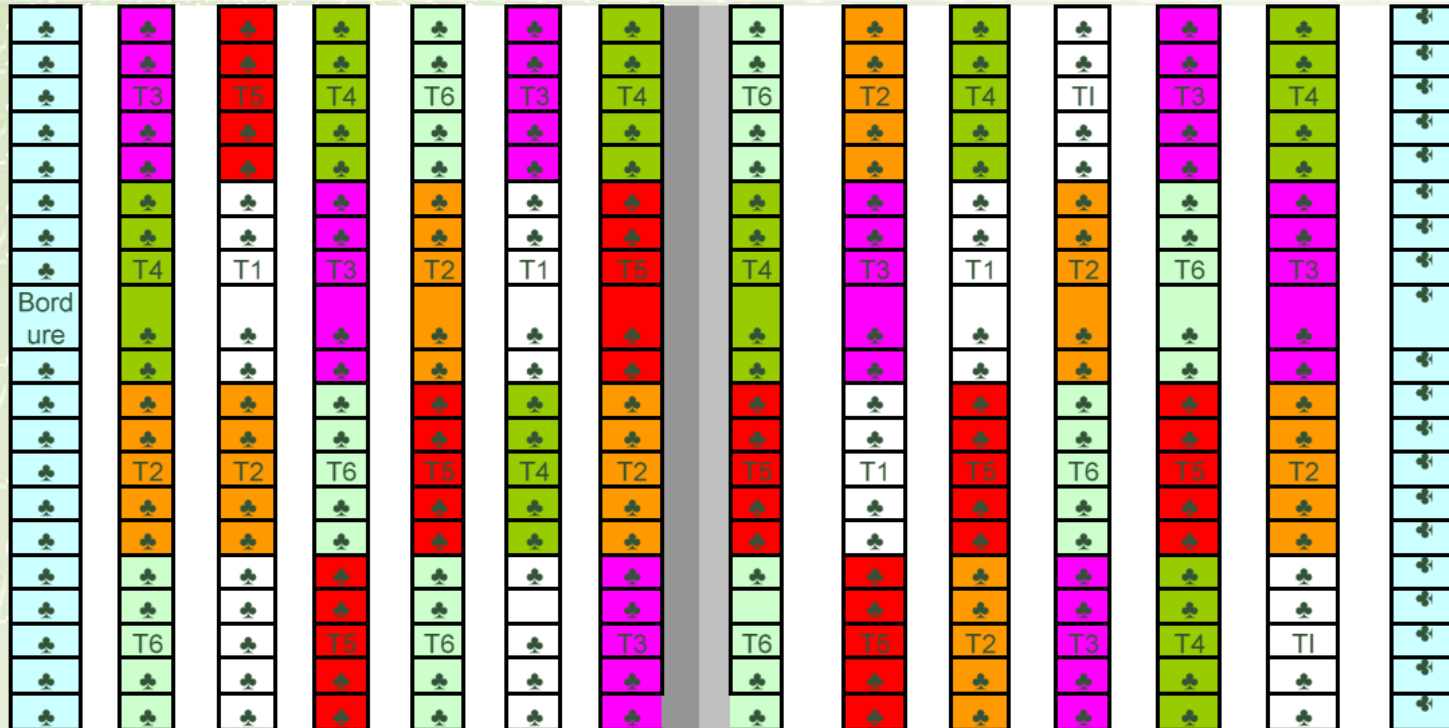
- CRBD
 - 4 Replicates per treatment
 - 1 Replicate = 5 plants



Immunes in **Zucchini** Grown in **SOIL** Experimental Design

Cultivar Apus

Cultivar Queen



- T1: Negative control
- T2: IMMUTINES applied once as Drench (0.15%)
- T3: IMMUTINES applied once as Drench (0.30%)
- T4: IMMUTINES applied twice as Drench (0.30%) (6 weeks a part)
- T5: IMMUTINES applied once as Foliar (1%)
- T6: IMMUTINE applied twice as Foliar (1%) (6 weeks a part)



Immutines in **Zucchini** Grown in **SOIL** Experimental Greenhouse

New Insect Net Installed



Soil Greenhouse Preparation



Immutines in **Zucchini** Grown in **SOIL** Experimental Design

Planting the Crop in soil

**Planting density 1 m on row; 2 m
between rows**





Immutines in **Zucchini** Grown in **SOIL** Experimental Greenhouse on 9 January 2008

Cultivar Apus



Cultivar Queen





Immutines in **Zucchini** Grown in **SOIL** 21 January 2008

Leaf Measure: Length and Width



Immunes in **Zucchini** Grown in **SOIL** 21 January 2008



Leaf Measure



Immutines in Zucchini Grown in SOILLESS
26 January 2008



Immutines Impact on Leaf Size





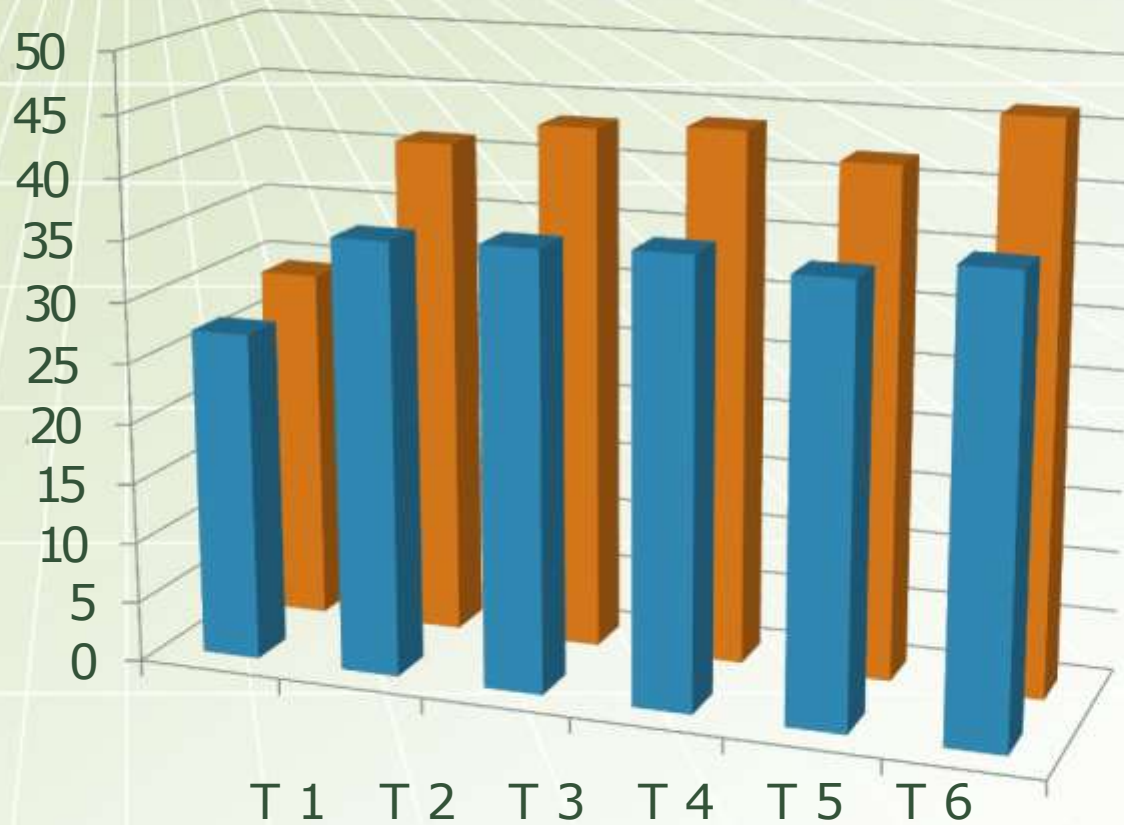
Impact of Immutinines on leaf size of Zucchini (cv. Apus) grown in soilless

Length (l) and width (L) in cm of Leaves of Zucchini (cv. Apus) grown in Soilless

Treatment	T1		T2		T3		T4		T5		T6	
Replicate	L	l	L	l	L	l	L	l	L	l	L	l
1	24	26	33	37	34	40	32	43	34	37	34	44
2	24	29	37	48	35	41	38	47	39	47	32	43
3	24	28	35	40	36	44	35	41	37	46	38	48
4	27	33	37	40	37	40	37	49	36	41	35	48
5	24	29	38	50	35	44	38	47	41	47	36	46
1	25	32	37	46	38	41	38	46	22	25	38	48
2	27	34	36	45	37	39	39	45	37	49	38	47
3	27	28	34	40	35	40	38	39	39	44	41	48
4	27	34	38	44	35	45	39	45	36	40	39	47
5	36	31	37	43	36	45	36	44	36	46	34	42
1	28	26	40	39	37	47	35	42	36	45	39	46
2	32	38	39	38	42	52	35	43	40	44	37	43
3	27	29	37	43	36	41	36	40	34	41	38	47
4	28	27	33	39	36	47	36	44	40	45	39	48
5	27	28	36	39	36	42	36	43	38	42	37	47
1	27	28	29	35	33	40	36	43	20	20	39	47
2	28	28	32	35	34	44	35	39	36	46	38	48
3	28	26	34	40	36	42	36	45	36	44	37	45
4	27	27	36	45	38	49	40	47	37	43	38	47
5	27	26	36	38	35	42	36	45	39	46	39	47
Average	27,2	29,4	35,7	41,2	36,1	43,3	37	43,9	36	41,9	37,3	46

Impact of Immutines on leaf size of Zucchini (cv. Apus) grown in soilless

Length (l) and width (L) in cm of Leaves of Zucchini (cv. Apus) grown in soilless



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Impact of Immutines on leaf size of Zucchini (cv. Apus) grown in soilless

Length (l) and width (L) in cm of Leaves of Zucchini (cv. Apus) grown in soilless

Impact of Immutines on leaf size of Zucchini

Major Conclusions

1. Immutines application improved leaf size especially leaf length.

1. The impact of Immutines was highest when Immutines was applied twice as foliar (T6) (1%) or when Immutines was applied once as foliar or as a drench to the soil (0.3%) (T3 and T4).





Evaluating the impact of Immutines on Zucchini yield

First Zucchini Harvest





Evaluating the impact of Immutines on Zucchini yield

Spectacular Impact of Immutines on Early Harvest

Note the low yield of the control (T1) as compared to Immutines in the first harvest

Immutines= Early and High Production



Measuring the fruits on 28 February 2008



Evaluating the Impact of Immutinines on Zucchini yield

Impact of Immutinines on Yield of Zucchini cv. Apus grown in Soilless system

Date	Harvest	T1		T2		T3		T4		T5		T6		
		Fruit NB	Fruit Weight	Fruit NB	Fruit Weight	Fruit NB	Fruit Weight	Fruit NB	Fruit Weight	Fruit NB	Fruit Weight	Fruit NB	Fruit Weight	
26/01/2008	R1	1	2	0,31	2	0,4	2	0,46	0	0	3	0,6	1	0,25
28/01/2008		2	2	0,35	1	0,225	4	0,734	3	0,6	3	0,52	2	0,5
29/01/2008		3	0	0	0	0	0	4	0,7	0	0	2	0	0
31/01/2008		4	4	1,5	3	1,1	1	0,25	2	0,49	3	0,9	2	1,65
02/02/2008		5	3	0,63	2	0,5	3	0,68	3	0,85	3	0,7	3	0,73
04/02/2008		6	3	0,7	4	0,9	4	0,95	5	1,13	3	0,7	3	0,67
06/02/2008		7	4	0,98	3	0,75	3	0,69	5	1,14	3	0,8	4	1,07
08/02/2008		8	4	0,95	5	1,2	3	0,68	6	1,3	5	1,1	7	1,38
10/02/2008		9	5	1,02	4	0,89	4	0,9	5	1,01	7	1,4	6	1,2
13/02/2008		10	4	0,78	5	0,98	5	0,96	4	0,76	5	1,01	5	1,02
15/02/2008		11	1	0,2	1	0,18	2	0,48	3	0,57	4	0,48	3	0,62
17/02/2008		12	2	0,4	1	0,2	1	0,2	3	0,59	3	0,57	3	0,6
26/01/2008	R2	1	2	0,51	2	0,5	0	0	0	0	0	0	3	0
28/01/2008		2	2	0,42	1	0,15	0	0	2	0,34	1	0,21	0	0
29/01/2008		3	2	0,33	1	0,2	1	0,15	0	0	0	0	3	0,21
31/01/2008		4	3	0,7	2	0,49	6	1,8	3	0,99	1	0,5	0	0
02/02/2008		5	2	0,46	1	0,2	1	0,2	3	0,65	3	0,63	3	0,23
04/02/2008		6	5	1,12	4	0,89	3	0,65	4	0,88	4	0,97	3	0,64
06/02/2008		7	4	0,99	3	0,68	5	1,11	5	1,3	4	0,95	6	1,4
08/02/2008		8	5	1,2	4	0,83	6	1,25	4	0,8	6	1,25	6	1,28
10/02/2008		9	4	0,89	4	0,8	5	1,01	5	1,02	5	1,08	5	1,08
13/02/2008		10	3	0,6	5	0,97	4	0,84	5	1,08	4	0,86	5	1,07
15/02/2008		11	3	0,62	4	0,46	3	0,68	3	0,62	4	0,46	5	1,08
17/02/2008		12	2	0,44	3	0,65	2	0,45	2	0,4	4	0,48	4	0,48
26/01/2008	R3	1	0	0	2	0,356	1	0,22	2	0,44	3	0,61	3	0,5
28/01/2008		2	3	0,5	1	0,15	2	0,346	2	0,4	1	0,19	1	0,242
29/01/2008		3	2	0,33	0	0	2	0,38	1	0,18	0	0	4	0,16
31/01/2008		4	1	0,27	2	0,596	1	0,22	0	0	1	0,2	3	0,24
02/02/2008		5	3	0,7	4	1,1	2	0,48	2	0,5	4	0,9	3	0,65
04/02/2008		6	1	0,2	2	0,48	3	0,68	4	0,98	3	0,67	3	0,72
06/02/2008		7	4	0,94	7	1,69	6	1,38	8	1,9	2	0,44	3	0,74
08/02/2008		8	3	0,68	4	0,84	5	1,03	8	1,8	6	1,3	7	1,4
10/02/2008		9	4	0,9	5	1,04	6	1,23	6	1,2	5	1,03	6	1,2
13/02/2008		10	5	1,02	7	1,46	6	1,23	5	0,98	7	1,48	7	1,46
15/02/2008		11	3	0,6	4	0,47	5	1,02	4	0,48	4	0,45	0	0
17/02/2008		12	3	0,63	3	0,65	5	1,06	3	0,64	3	0,6	0	0
26/01/2008	R4	1	0	0	2	0,34	0	0	1	0,16	3	0,69	0	0
28/01/2008		2	3	0,63	1	0,183	2	0,33	0	0	3	0,65	2	0,412
29/01/2008		3	2	0,4	1	0,215	1	0,18	1	0,22	0	0	0	0
31/01/2008		4	0	0	0	0	1	0,3	2	0,48	3	1,21	0	0
02/02/2008		5	2	0,44	3	0,8	2	0,52	3	0,75	3	0,8	2	0,48
04/02/2008		6	2	0,42	3	0,65	4	0,912	4	0,95	1	0,25	2	0,46
06/02/2008		7	1	0,28	6	1,42	3	0,8	6	1,2	1	0,28	5	1,01
08/02/2008		8	4	0,86	5	1,1	4	0,89	5	1,02	6	1,19	5	1,03
10/02/2008		9	3	0,63	4	0,98	4	0,9	5	1,05	5	1,06	6	1,28
13/02/2008		10	4	0,81	5	1,03	4	0,81	6	1,34	6	1,2	6	1,26
15/02/2008		11	4	0,82	3	0,62	3	0,64	2	0,4	3	0,6	3	0,6
17/02/2008		12	4	0,85	1	0,2	2	0,39	1	0,19	2	0,19	5	0,2



Impact of Immutines on Yield of Zucchini cv. Apus grown in Soilless system

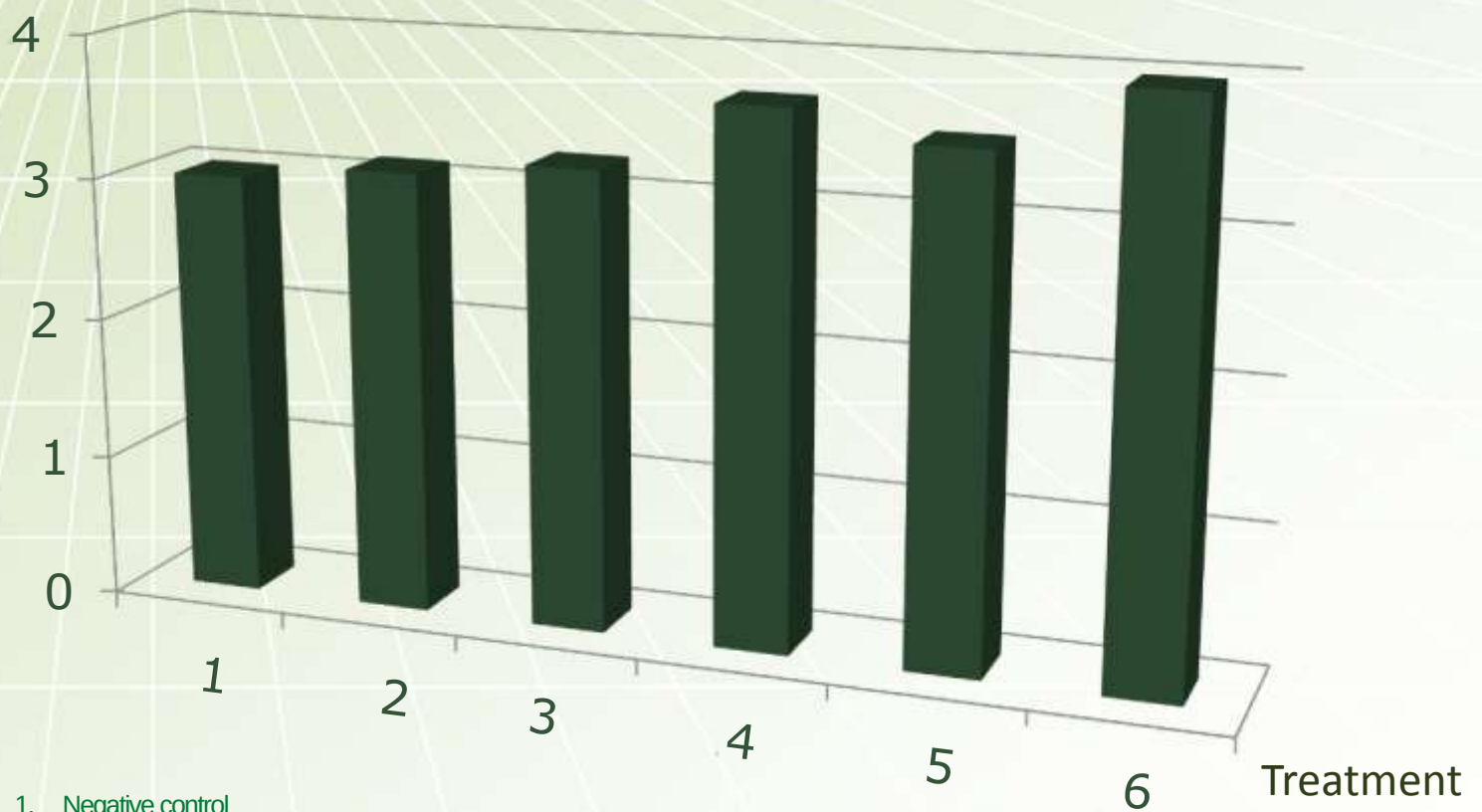
Average number of fruits and yield per period of harvest

Harvest Dates	26-31 January 2008		2-6 February 2008		8-13 February 2008		15-17 February 2008	
	Number of Fruits	Average Weight	Number of Fruits	Average Weight	Number of Fruits	Average Weight	Number of Fruits	Average Weight
T1	1,75	0,39	2,8	0,7	4	0,86	2,75	0,57
T2	1,3	0,31	3,5	0,8	4,8	1	2,5	0,5
T3	1,5	0,34	3,25	0,8	4,7	1	2,9	0,6
T4	1,4	0,31	4,3	1	5,3	1,1	2,6	0,5
T5	1,6	0,39	2,8	1	5,6	1,2	3,3	0,5
T6	1,3	0,3	3,3	0,7	6	1,2	2,9	0,5

1. Negative control
2. Immutines applied once as Drench (0.15%)
3. Immutines applied once as Drench (0.30%)
4. Immutines applied twice as Drench (0.30%) (6 weeks a part)
5. Immutines applied once as Foliar (1%)
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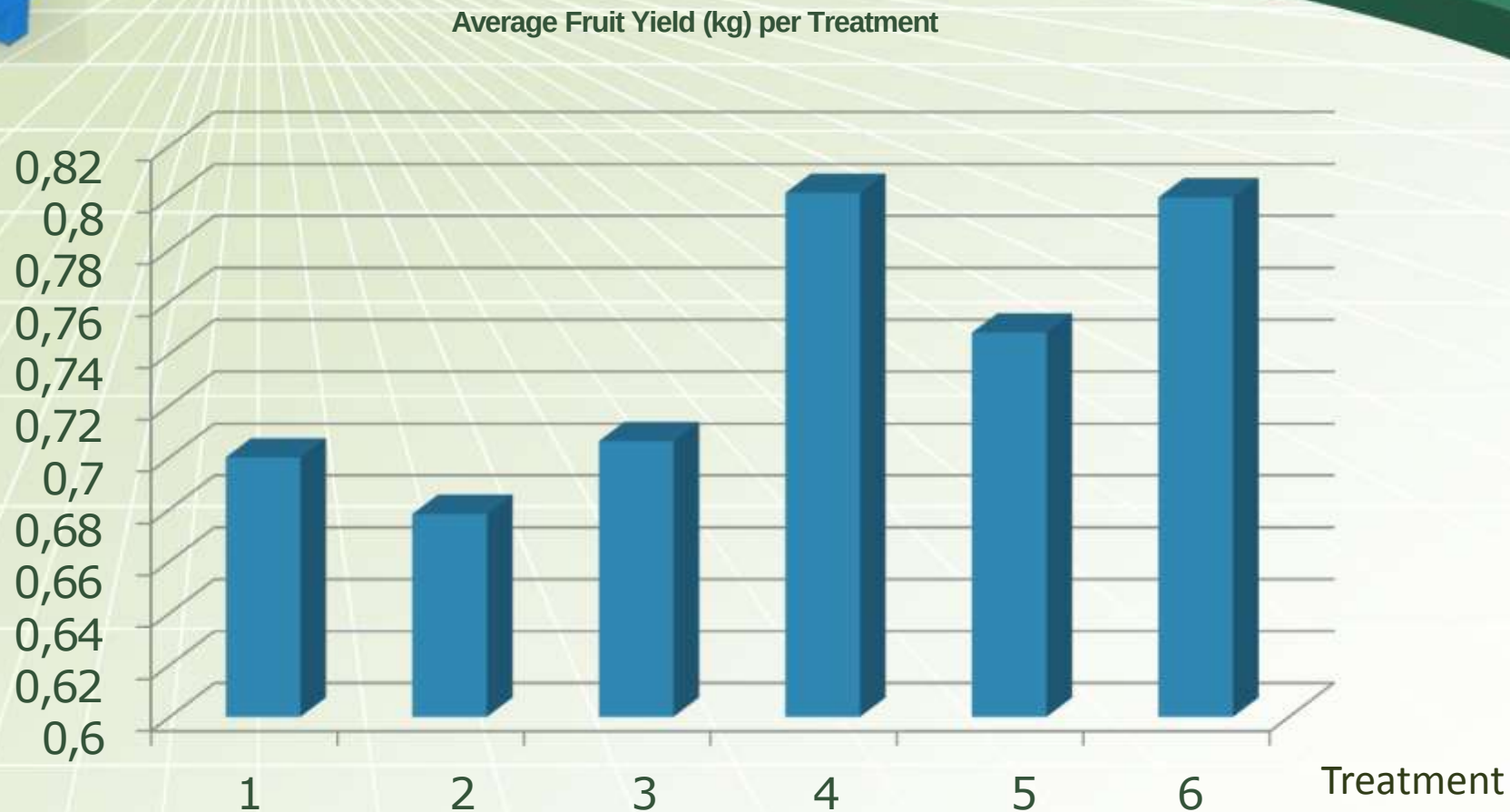
Impact of Immutines on Yield of Zucchini cv. Apus grown in Soilless system

Average number of fruits per harvest



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Impact of Immutines on Yield of Zucchini cv. Apus grown in Soilless system



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Impact of Immutines on Root of Zucchini cv. Apus grown in **Soilless system**

Harvesting the Root System



Harvesting the Root System



Impact of Immutines on Root of Zucchini cv. Apus grown in Soiless system

Harvesting the Root System 27 February 2008



Washing the Roots from the Substrate



Impact of Immutines on Root of Zucchini cv. Apus grown in Soiless system

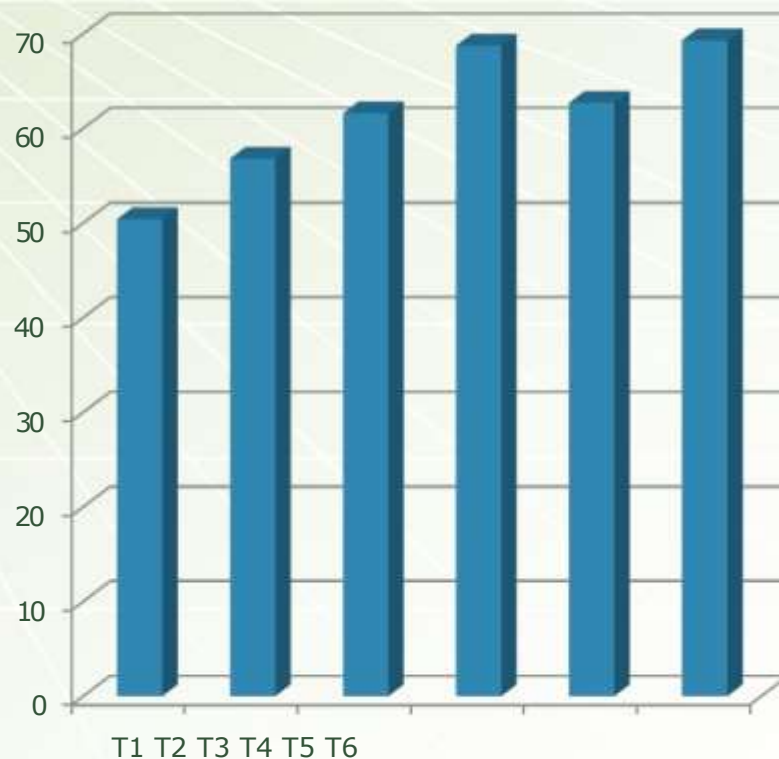
Harvesting the Root System 27 February 2008



Dry Weight (g) of 8 Root Systems/Treatment



1. Negative control
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1. Immutines applied twice as Drench (0.30%) (6 weeks a part)
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Some Concluding Remarks concerning Immutines and Zucchini grown in Soilless System

- 
- All Immutines Treatments have improved leaf size, number of fruits and total yield
 - All Immutines treatments have caused an early flowering and consequently an early production as compared to the control
 - The best performance in terms of fruit number and fruit yields were achieved in the treatment which received two foliar applications of Immutines (1%) followed by the treatment which received two applications as drench (0.30%).
 - Even one foliar application of Immutines (1%) achieved better results than drenching (0.15% or 0.30%).
 - The concentration of 0.15% of Immutines produced slightly better results than the negative control.
 - Immutines enhanced root volume and root dry weight. Again two foliar applications (1%) and two drench applications (0.30%) produced the largest root system.

PS: Data relative to the two cultivars grown in soil was not presented in this report because of severe powdery mildew which affected the results of the trial in soil