

NSW, primary Industry:
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Technical Conference

Managing mandarins for profit

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Israel citrus-Main difficulties:

1. Profit reduction

Prices - Last five years and today – the market prices are same and as well as the income

Costs - production costs increase in 30%.

•Costs today- 13,000 Aud/Ha

•Costs 5 years ago-10,000 Aud/Ha

Shamouti: income - 12,000 dollars/Ha



'ORRI' :income - 30,000 dollars/Ha



What is the Israeli future direction?

1. Developing high value mandarins

- **Productive and stable yield**
- **Seedless- low seeds.**
- **Very tasty (sweet)**
- **Easy peeling and not splitting**
- **Resistant to 'Alternaria brown spot**
- **Strong peel. Long shelf life**

2. Developing treatments to minimize mandarins disadvantages

1. Increase yield

2. Decrease alternation

3. Enlarge fruits size.

4. Improve taste

5. Improve peel strength for more freshness and to reduce decay.

6. Decrease Seeds number

Profitability of citrus orchard in Israel

(based on 40 ton/Ha crop)

- **Orri: 30,000** dollars/Ha
 - **Michal, Meirav, Orra -21,000** dollars
 - **Nova, Minneola – 15,000** dollars/Ha
 - **Newhall – 14,000** dollars/Ha
 - **Shamouti orange- 12,000** dollars/Ha
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- **Yearly expenses-13,000** dollars/Ha

Orii main costs (Aud/Ha- 2012)

<u>Subject</u>	<u>Amount</u>	<u>cost</u> (dollars/ha)
picking	40 ton/Ha	4,600
sprays	10 times	3,500
water	6500 (m3 / Ha)	2,850
Other	Net, fertilizers weeds control	2,050
All costs		13,000

What affect mandarin Profitability?

- Profit =
(**Yield**, ton/Ha x **Price**) - expenses.
- Price =
fruits size
fruits quality (packing percentage)
ripening Season, market location

In which parameters the grower can improve profitability?

1. Yield : 40-50 ton/Ha
2. Fruit size: 65-75 mm (in diameter)
3. Fruit quality- tasty. Tss: 12-15%,
Acid : 0.8-1.2%.
4. Peel quality: strong peel, good
shelf life.

How to get yearly good and stable yield in mandarins ?

1. On year: Thin fruits to the correct amount, and increase size (if it needs) according to market demand.

2. Off year: Increase fruit set by girdling and Gibberellin spray.

The most important factors that have the most effect on profit:

1. Yield.

2. Size (large fruits).

Desirable fruits amount for each tree

(desirable amount - 350,000 fruits/Ha)

TREE SPACING	TREES (number / ha)	FRUITS (number / tree)
5 X 2 m	1000	350
5 X 3 m	667	525
6 X 3 m	555	630
6 X 4 m	417	840

Desirable size and yield in mandarins

(desirable no - 350,000 fruits/Ha)

FRUITS (no'/ Ha)	FRUITS size -mm	FRUIT weight (gram)	yield (ton/Ha)
350,000	60-55	90	31.5
350,000	65-60	104	36.5
350,000	70-65	133	46.5
350,000	75-70	158	55.3

Orii market prices (in grower pocket)

FRUIT SIZE (mm)	PRICE- 2012 dollars/ton (pack)	(%)
55 – 50	430	100
60 - 55	650	150
65 - 60	870	200
75 - 65	1300	300

How to Manage mandarins orchard to profitability?

1. Year on - too many fruitlet. Must thin fruitlets by: deep pruning, growth regulators, and some time also by hand thinning (if need).
2. Year off : Few amount of flowers and/or poor fruit set and yield. Improve fruit set and yield by girdling (1-2 times), spray with Gibberellin and careful pruning.

: 'ORRI' – too many fruit: small size, low value



'ORRI' – OVER CROOPING



Orri – year on- over cropping. You see the disaster after color brake



Orri – over cropping in spite of spraying with growth regulators. (needs hand thinning)



Michal – Extreme Excess fruits amount



Michal – Extreme Excess fruits amount



Treatments to thin mandarins fruitlets and fruits in year 'on'

1. Growth Regulators - spray the trees with G.R. (2-3 times)

Time of application: fruitlets 10-25 mm in diameter: Nov'- Jan' - Depend on fruitlets amount on trees.

2. Hand thinning: Feb-March. 10-20 work days to thin 1 hectare, if there is excess fruits remain

Important facts we should know before using Growth Regulators

- 1. Hot day - Growth Regulators sprays in hot day, or 1-2 days after, can cause much or total fruitlets drop.**
- 2. Fruitlets sensitivity – very high when fruitlets 10-15 mm, medium - 16-18 mm, and low – 19-20 mm.**

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Important facts we should know before using Growth Regulators

3. GR spray reduce usually 30-50% of the total. In some on years trees can produce 1500- 3000 fruits/tree. We want 500-600 fruits/tree. So, you must chack the spray result after 14 days and spray again or hand thinning, if there are too many fruits on the trees.

'ORRI' FRUITLETS SPLIT- 10 weeks after pettle fall



9 mm



12 mm



15 mm



16 mm



18 mm



21 mm



24 mm



27 mm

Growth regulators application time, regarding to fruitlets size (diameter)

<u>variety</u>	<u>Flowering time</u>	<u>Application time</u>	<u>Fruitlet Size</u>
Newhall	Septem	November	25 mm
Michal	October	December	12-15 mm
nova	October	December	16-20 mm
Orri	October	January	15-18 mm

Growth regulators types

<u>Name</u>	<u>Commercial name</u>	<u>influence</u>
2,4 –D , 18 ppm	Hdranol	enlarge
2,4–DP - 50 ppm	Magdilon	enlarge
2,4–DP - 60 ppm	Prigan	Thin + enlarge
NAA – 300 ppm	Alphanol	Thin +enlar
3,5,6 –TPA 10 ppm	Maxim	Thin +enlar

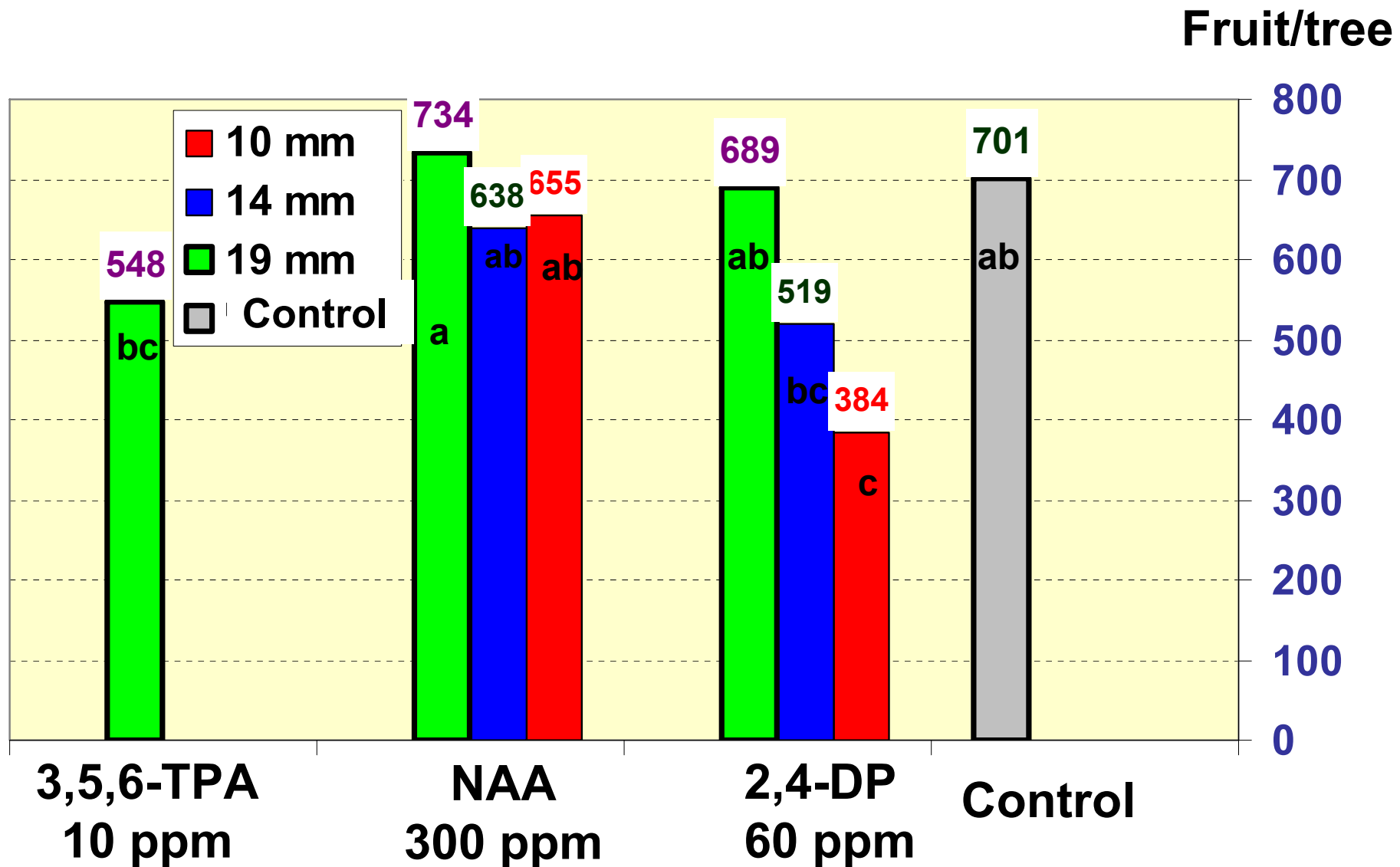
Cost of Growth regulators spray

<u>Growth regulator</u>	<u>Spray amount</u>	<u>Cost</u> dollar/Ha
2,4 -D , 18 ppm	3000 L/Ha	250
2,4-DP - 50 ppm	3000	350
2,4-DP - 60 ppm	3000	350
NAA - 300 ppm	3000	290
3,5,6 -TPA 10 ppm	3000	380

**EFFECT OF NAA, 3,5,6-TPA, 2,4-DP(prigan)
SPRAYS, ON 'ORRI' FRUIT NUMBER PER TREE
 (667 trees/hectare. Desirable fruits/tree - 525)**

TREATMENT	FRUITLETS 10 m''m	FRUITLET 14 m''m	FRUITLET 19 m''m
CONTROL	701 a	701 a	701 a
2,4- DP - 60 ppm	384 c	519 b	689 ab
NAA - 300 ppm	655 ab	638 ab	734 a
3,5,6-TPA-10 ppm	—	—	548 b

Effect of Growth Regulators on 'Orri' fruit number



Effect of 3 following sprays with Growth Regulators

TREATMENT	FRUITLETS 7 m''m	FRUITLET 10 m''m	FRUITLET 13 m''m
CONTROL	—	—	—
2,4- DP - 50 ppm	V	V	—
2,4- DP - 60 ppm	—	—	V

Effect of Growth Regulators on yield fruits number and size

TREATMENT	YIELD (ton/ha)	FRUITS no/tree	FRUIT WEIG' gram/fruit
A. CONTROL	48 b	605 a	97 a
B. 2,4- DP 60ppm	46 b	462 c	139 b
C. 2,4- DP - 50 +B	61 a	551 b	158 a

Effect of 3 following sprays with G.R on the amount of large fruits(ton/Ha)

TREATMENT	small <60 mm	Medium 65-60	large >65 mm
A. CONTROL	33 a	12 c	3 c
B. 2,4- DP 60 ppm	18 b	17 c	11 b
C. 2,4- DP - 50 ppm(2X) +B	13 c	23 a	25 a

Orii prices- 2011/12

FRUIT SIZE (mm)	PRICE dollars/ton (pack)
55 – 50	430
60 - 55	580-720
65 - 60	870
75 - 65	1160-1450

Effect of 3 following sprays with G.R on the amount of income (dollar/Ha)

TREATMENT	Yield (ton/Ha)	income (dollars/Ha)
A. CONTROL	48 b	20,400 c
B. 2,4- DP 60 ppm	46 b	30,720 b
C. 2,4- DP - 50 ppm(2X) +B	61 a	48,115 a

'ORRI'- YOUNG TREE (YEAR 4). NO FRUITS



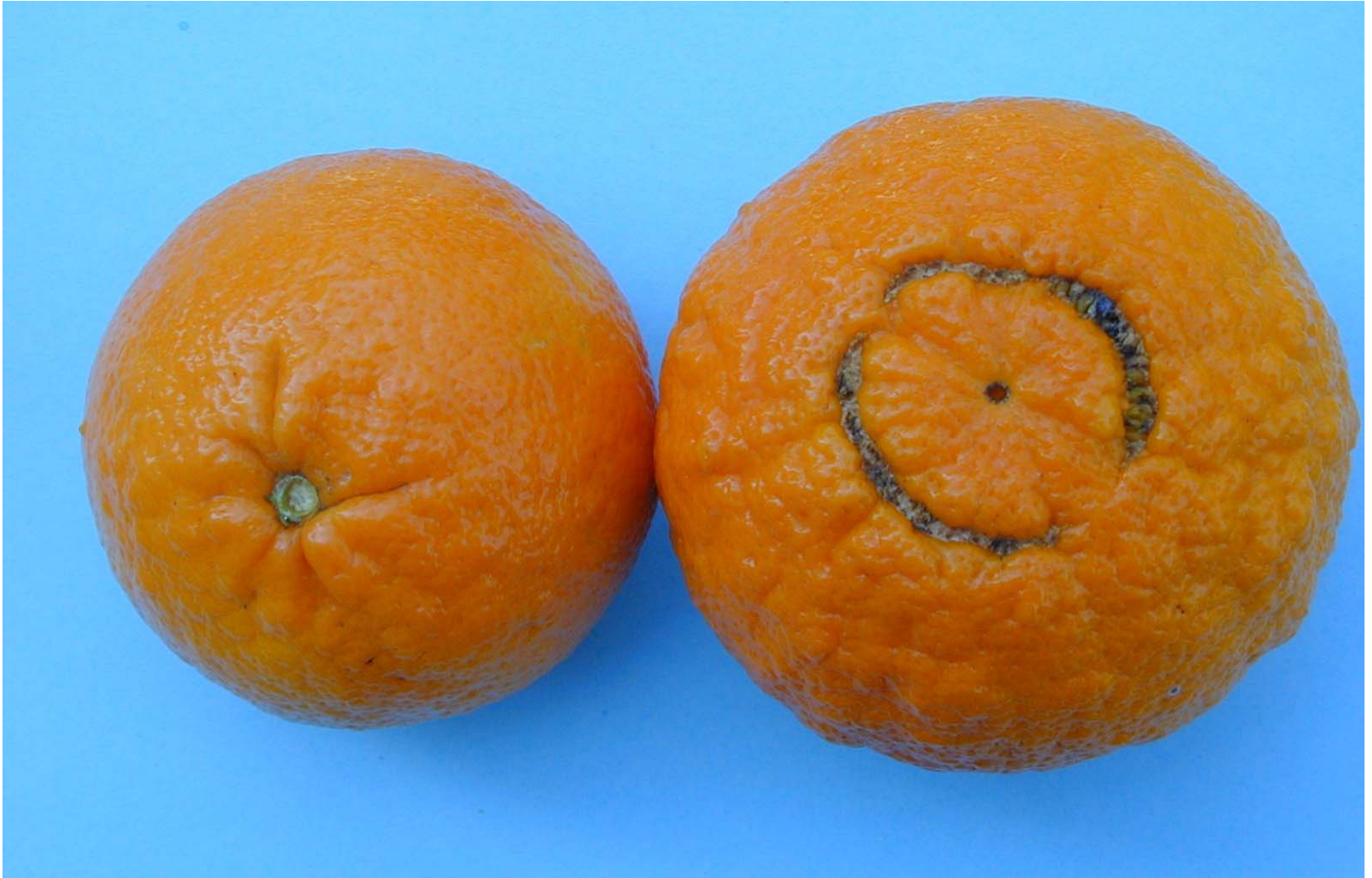
'ORRI'- off year , no fruits



'ORRI' 'OFF' YEAR - ALTERNATION



**‘ORRI’- COARSE PEEL IN HOT CLIMATE REGION
AND IN LOW YIELD.**



2. Increasing yield

- 1. Spraying with Gibberellin 50 ppm (toward the end of flowering)**
- 2. Girdling 90% of the branches.**
- 3. Girdling again the same 90% branches (fruitlets size – 8 mm in diameter)**

O.S. girdling scissors (50, 80 m"m)



'ORRI' TRUNK GIRDLING WITH METAL WIRE
(after 6 month, starting in late winter)



BRANCHES (50%-80%) GIRDELING



MAIN TRUNK GIRDELING



BRANCH GIRDLING (infected with Xyloporosis)



O.S. girdling scissors (50, 80 m''m)



O.S. girdling scissors- cutting disks



Left – girdled tree. Right- control



Girdled tree+ spray with Gib 50 ppm



Effect of girdling and

GA3 - 50 ppm spray on mandarin yield

(667 trees/hectare. Desirable fruits/tree - 525)

TREATMENT	YIELD (ton/Ha)	FRUITS no/tree	FRUIT Size (mm)
1. CONTROL	1.6	19	73
2. GA 3 - 50 ppm	13	176	68
3. Girdling +GA 3 - 50 ppm	34	477	68

'ORRI' 'OFF' YEAR - ALTERNATION



אלון
חיבור גזע 4.6.06
(חנטיס 5.6 מ"מ)

כתוב
ענבר גזע 18.7.06
(תנאים 19 מ"מ)

FIRST STAGE OF FRUITLETS DROP (3- 4 m''m)



'ORRI' FRUITLETS SPLIT- 10 weeks after pettle fall



9 mm



12 mm



15 mm



16 mm



18 mm



21 mm



24 mm



27 mm

STAGES OF FRUITLETS NATURAL DROP

- * **VERY SMALL FRUTLETS (3-4 m''m), IMMEDIATELY AFTER PETTLE FALL.**
- * **SMALL FRUTLETS (6-7 m''m), 4-5 WEEKS AFTER PETTLE FALL.**
- * **MAIN FRUITLETS DROP (10-20 m''m), START IN WEEK 5-6 UNTILL WEEK 9-10, AFTER PETTLE FALL.**

Effect of second girdling in year 'off' on 'Orri' mandarin yield and fruit size

TREATMENT	YIELD (ton/Ha)	FRUITS no/tree	FRUIT weight (gram)
CONTROL	16 c	146 b	135
Girdling- 6 mm	39 a	324 a	143
Girdling- 13 mm	31 ab	257 ab	145
Girdling- 19 mm	26 bc	143 ab	147

Effect of second girdling in year 'off' on the amount of 'Orri' large fruits

TREATMENT	YIELD ton/Ha	Large mm 60< (ton/Ha)	Small mm 60> ton/Ha
CONTROL	16 c	13 b	3 b
Girdling- 6 mm	39 a	28 a	11 a
Girdling- 13 mm	31 ab	25 a	6 ab
Girdling- 19 mm	26 bc	18 ab	8 a

**Thank you for your attention and
for your hospitality.**