Dutch tests of biocontrol agents and hot water treatments

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Dutch tests of biocontrol agents and hot water treatments

- Why using biocontrol agent (**BCA**) and hot water treatment (**HWT**)?
- Some results from the ISAFRUIT project W.P. 4.1 Non-chem fruit.
  - Decline of chemical treatments against storage diseases

Why using BCA and/or HWT?

- Tendency to use less chemical crop protection:
  - Keywords: sustainability, environment, food safety
  - Commercial need: Supermarkets demand fruits with residue concentrations < MRL.

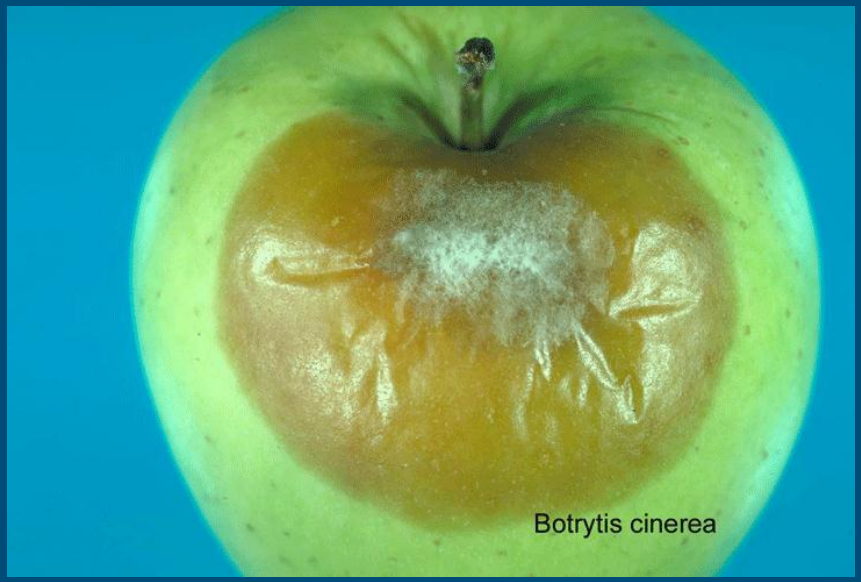
- Fungicides against rot in post harvest period ➔ sprayed at end of growing season➔ probably strong contribution to amount of residues on fruits.

Why using BCA and/or HWT?

- In organic fruit growing:
  To decrease rot incidences in storage period

Main groups of pathogens causing decay

- Wound pathogen fungi. Damaged skin => entry for pathogens.
  - *Botrytis cinerea* (gray mold)
  - *Penicillium expansum* (blue mold)



gray mold

Main groups of pathogens causing decay

- Latent infections
  (during the growing season)➔ expression during storage
  - *Gloeosporium album* (bull's eye rot)
  - *Nectria galligena*

bull's eye rot

More than 1 alternative treatment

- Wound pathogen (Botrytis) might be controled by an BCA. Principle: competition for food, colonizing the wound.
- Latent infections controled in another way. Gloeosporium : Hot water treatment.

- Combination of both ➔to be prepared for several possible infections

ISAFRUIT wp 4.1 NON-CHEM FRUIT experiments

- Testing the efficacy of treatments:
  - HW, BCA, HW and BCA, all compared to untreated
- Inoculation experiment
  - Damage the fruits
  - Spray spores of Botrytis. ➔ sure about an infection
- Natural infection: closer to reality but risk of no or not enough infected fruits.

Wounding

HWT treatment

2 minutes

±50°C

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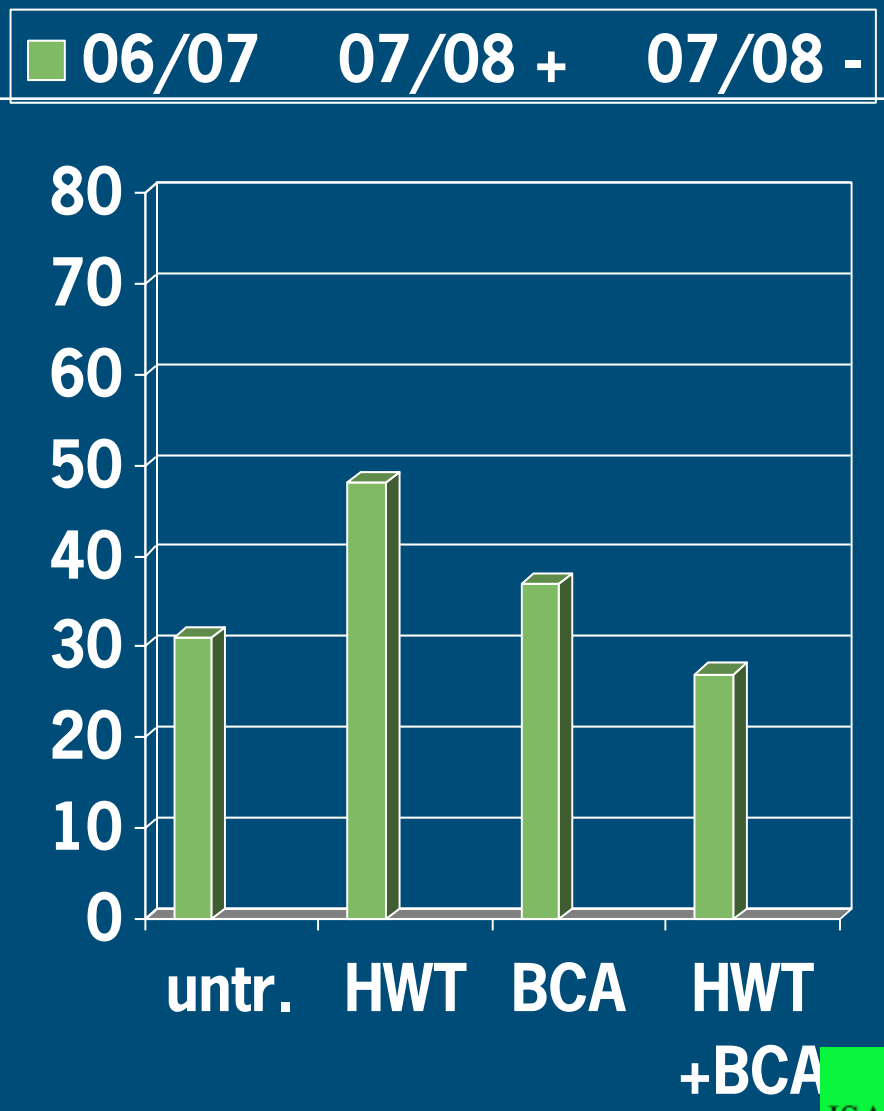
Treatments in experiments

- Sequence: Picking- wounding – HWT / BCA treatment- inoculation with Botrytis – CA-storage – developing rots – observation incidense of rots after storage period
- Only with inoculated fruits
- HWT, temperature ±50°C (depending on the variety)

Elstar, organic **inoculated** fruits in April

- 2006/2007 no efficacy of BCA
- Why? spraying continued to long? ➔ viability of the BCA



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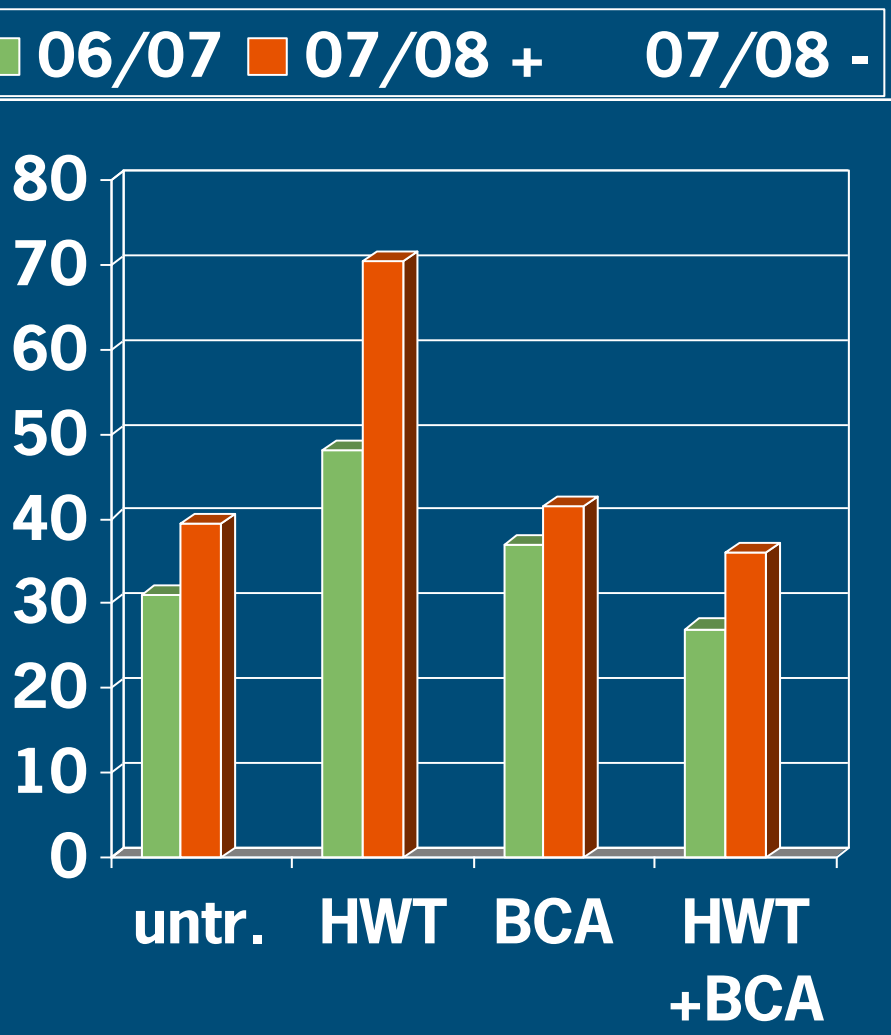
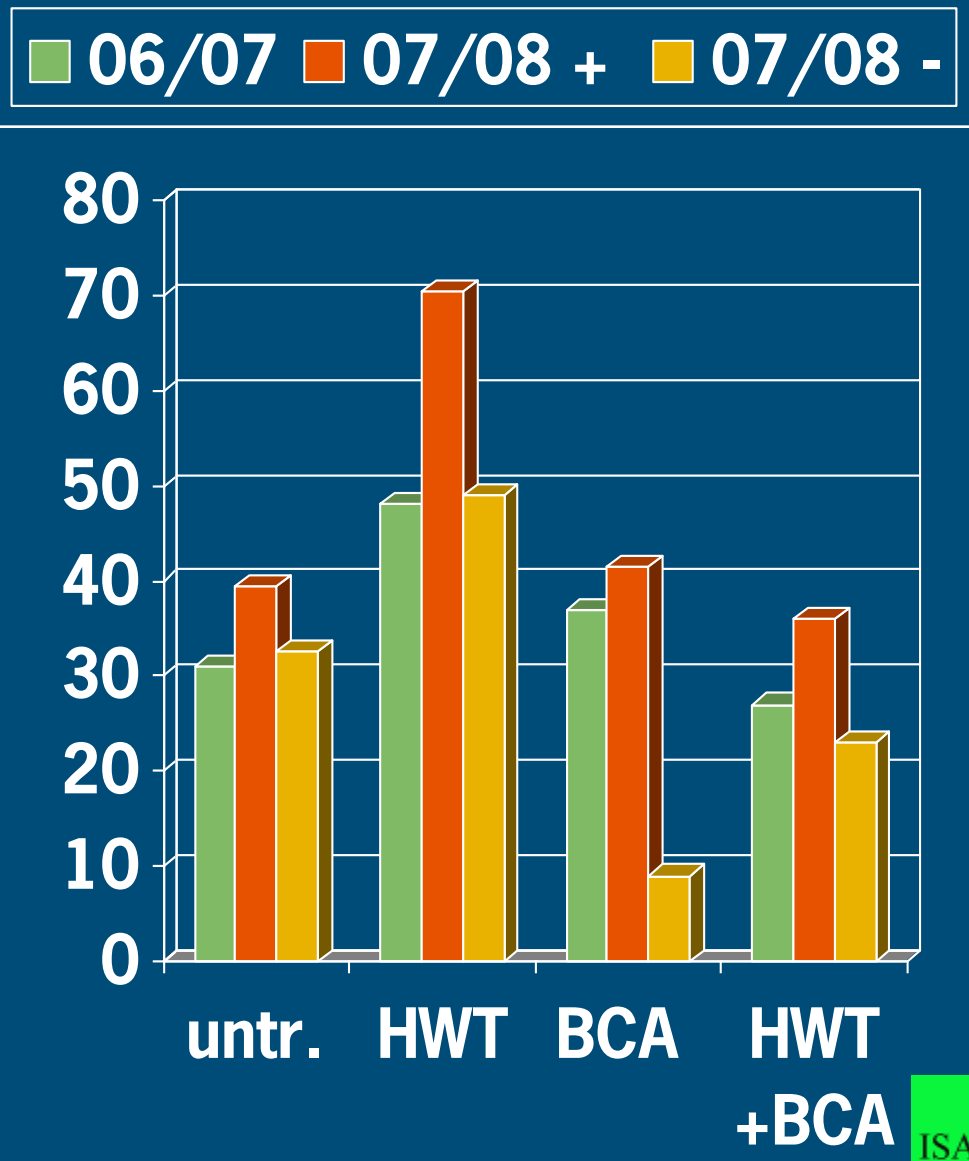


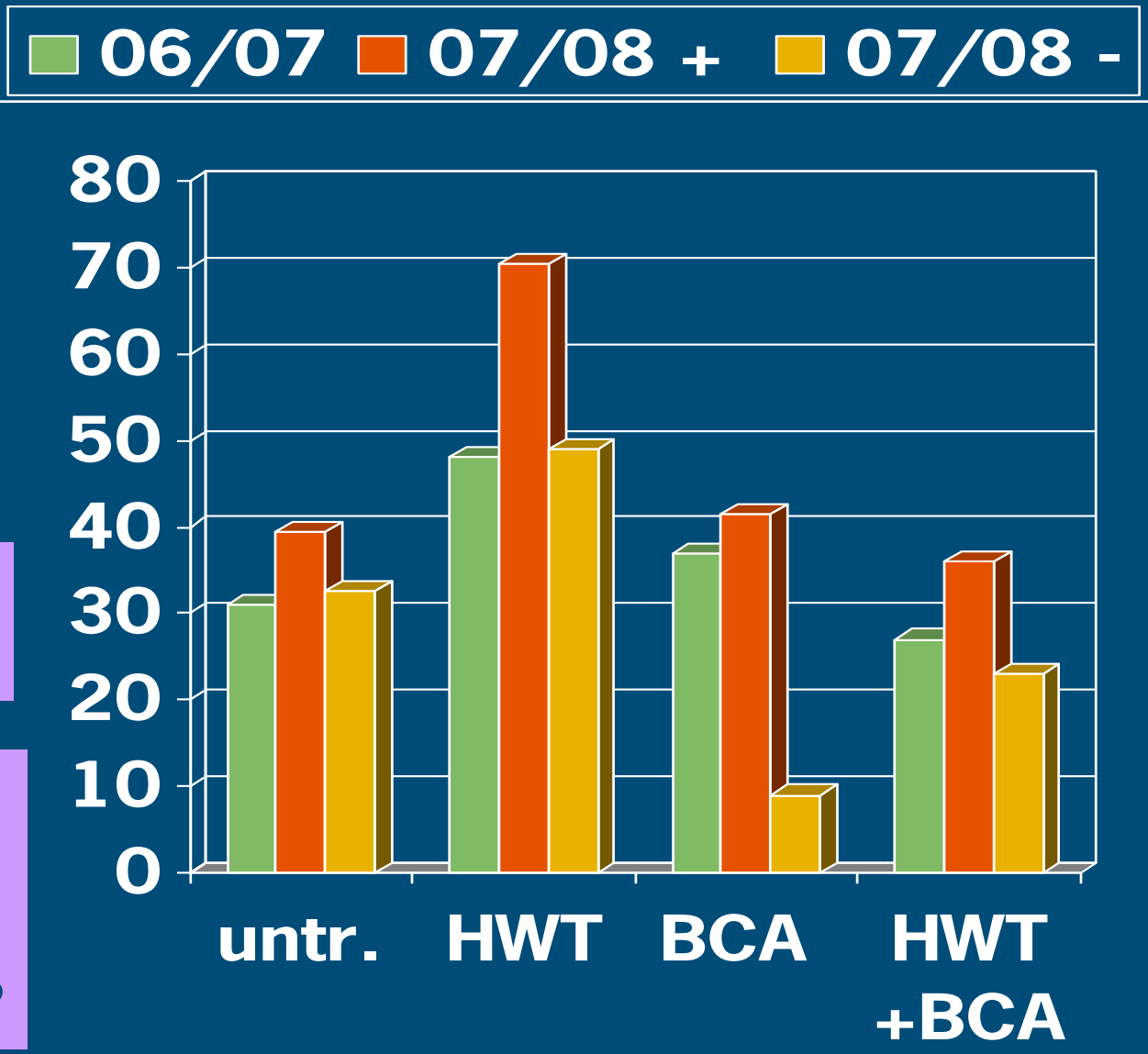
- **2007/2008 similar pattern**

Elstar, organic

inoculated fruits in april



- **No Cu/ S →BCA better working**



HWT more decay

micro lesions?

Less micro flora at surface?

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Copper and sulphur toxic for BCA?

- Test Laboratory University Gembloux (H. jijkali)
- BCA grown in petri dish
- Adding Cu, S or fungicides to nutrition of BCA.
- Measuring the effect on the size and number of colonies

MRL OF BOTH AS

FRUTOGARD (Cu) +KUMULUS (S)	10X MRL	MRL	0.1 x MRL	0.01 x MRL	0.001 x MRL
Results :					
Mean number of colonies	0.0	2.8	14.5	34.0	29.5
% of viability	0.0	8.7	45.7	107.3	93.1
Comment		Small colonies			

Source:

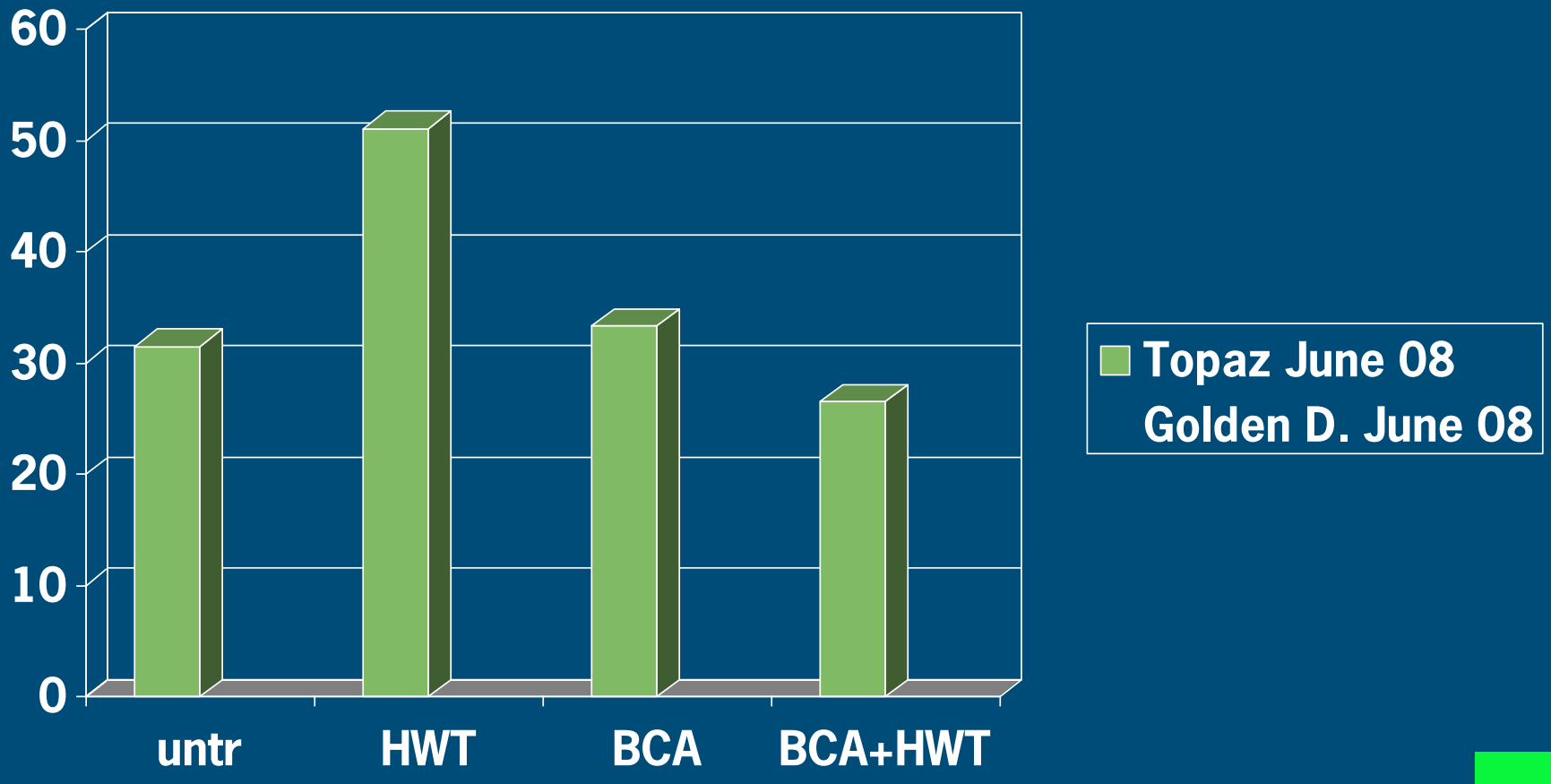
H.Jijakli, University of Gembloux

Results of toxicity check:

- Supports the theory : presence of Cu and Sulphur influences viability of the BCA
- Not shown here: Some fungicides show comparable effects
- Spraying fungicides, Cu and S might decrease viability of a postharvest added BCA.

  ➔ different for each BCA?

Results Topaz and Golden D. (Inoculated Botrytis)



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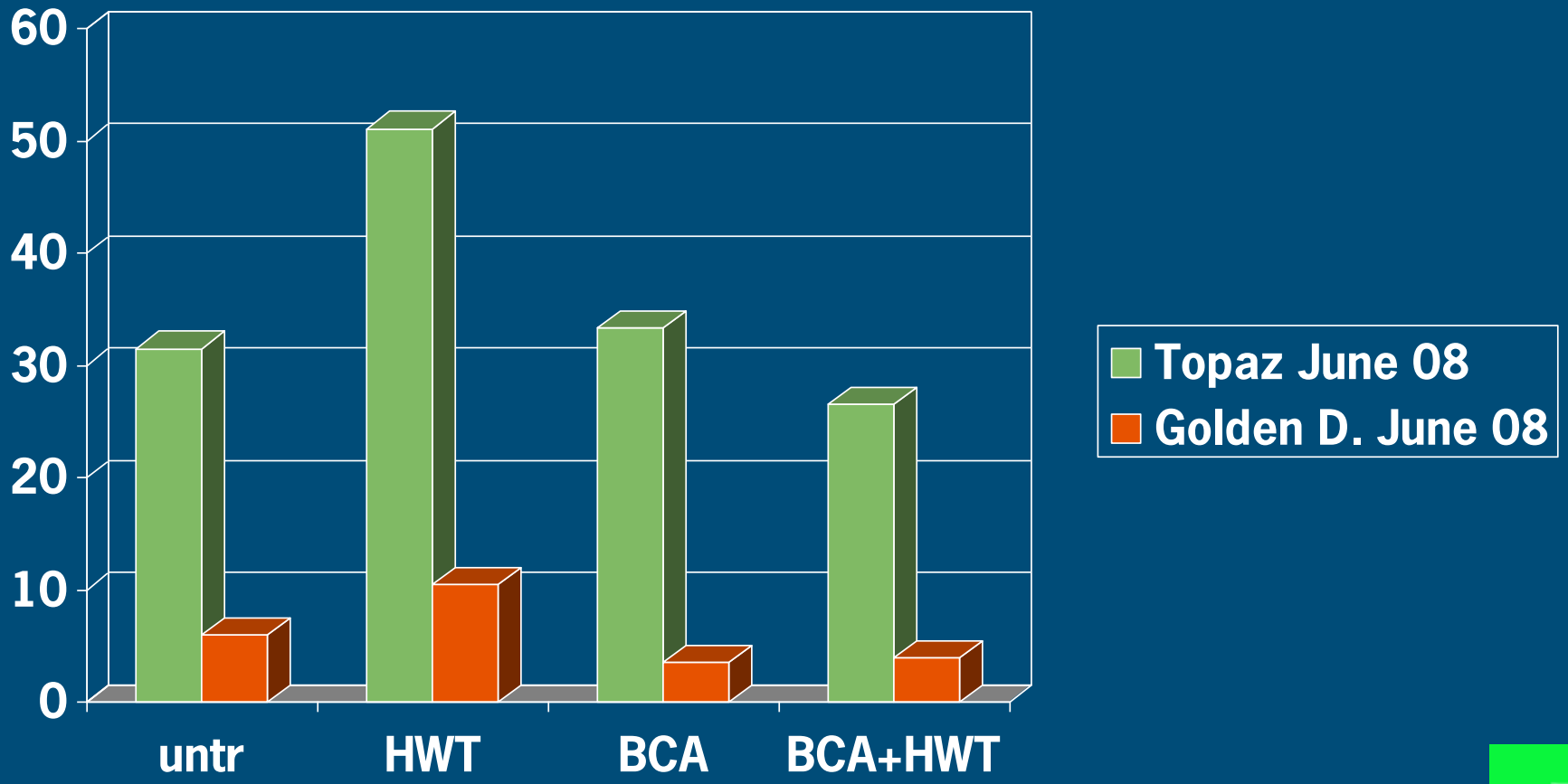

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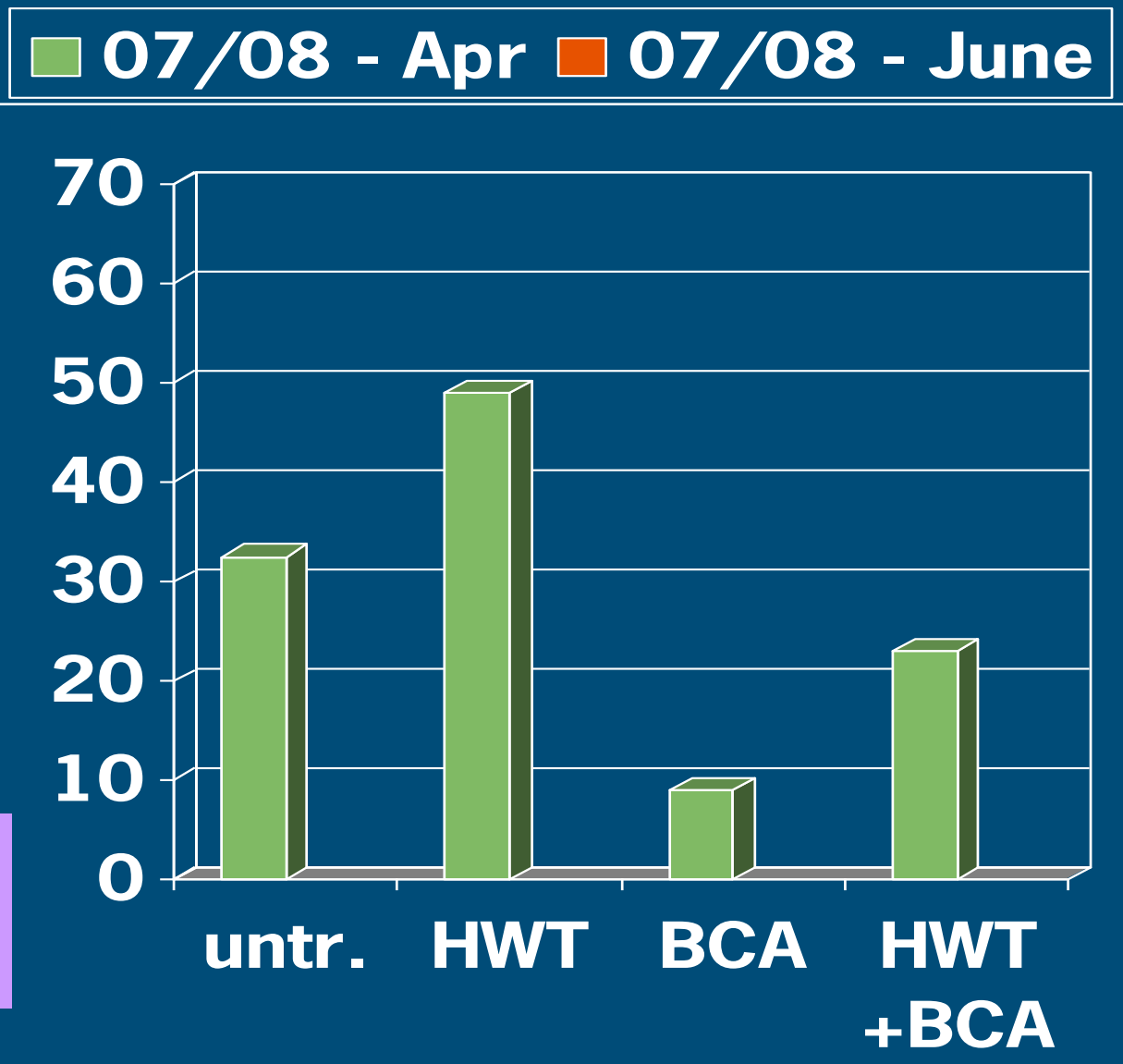

Elstar

07/08

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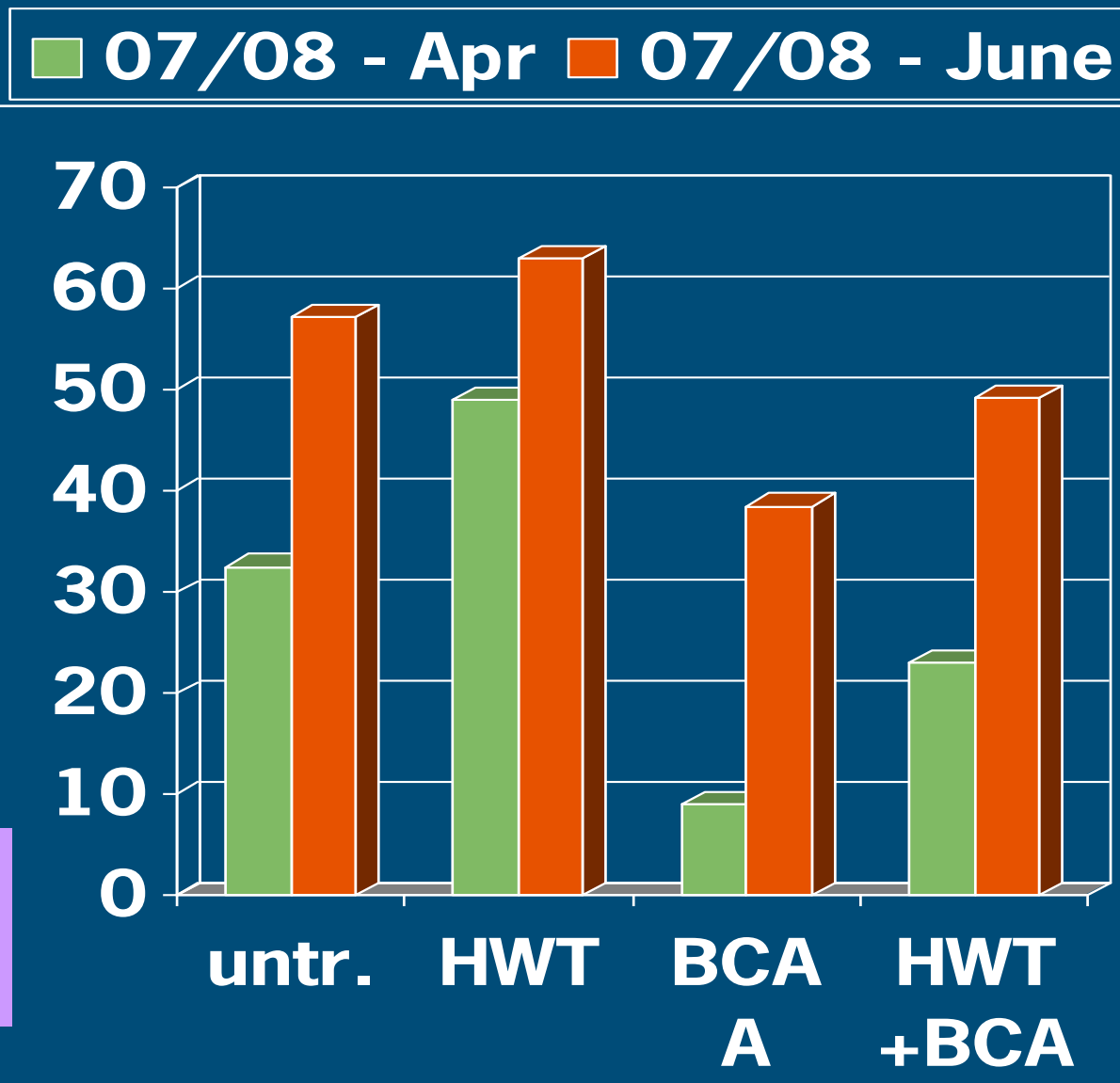

Elstar 07/08

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So far:

- Elstar: BCA effective against Botrytis in inoculation experiment.
- Effect less strong but still present after storage till June.
- Presence of residue might affect efficacy of BCA
- In other varieties not the same results.
- In experiments with natural infected fruits no clear results of BCA treatment. Probably due to:
  - Absence / less presence gray mold spores.
  - BCA not effective against other fungi

Hot water treatments in experiments

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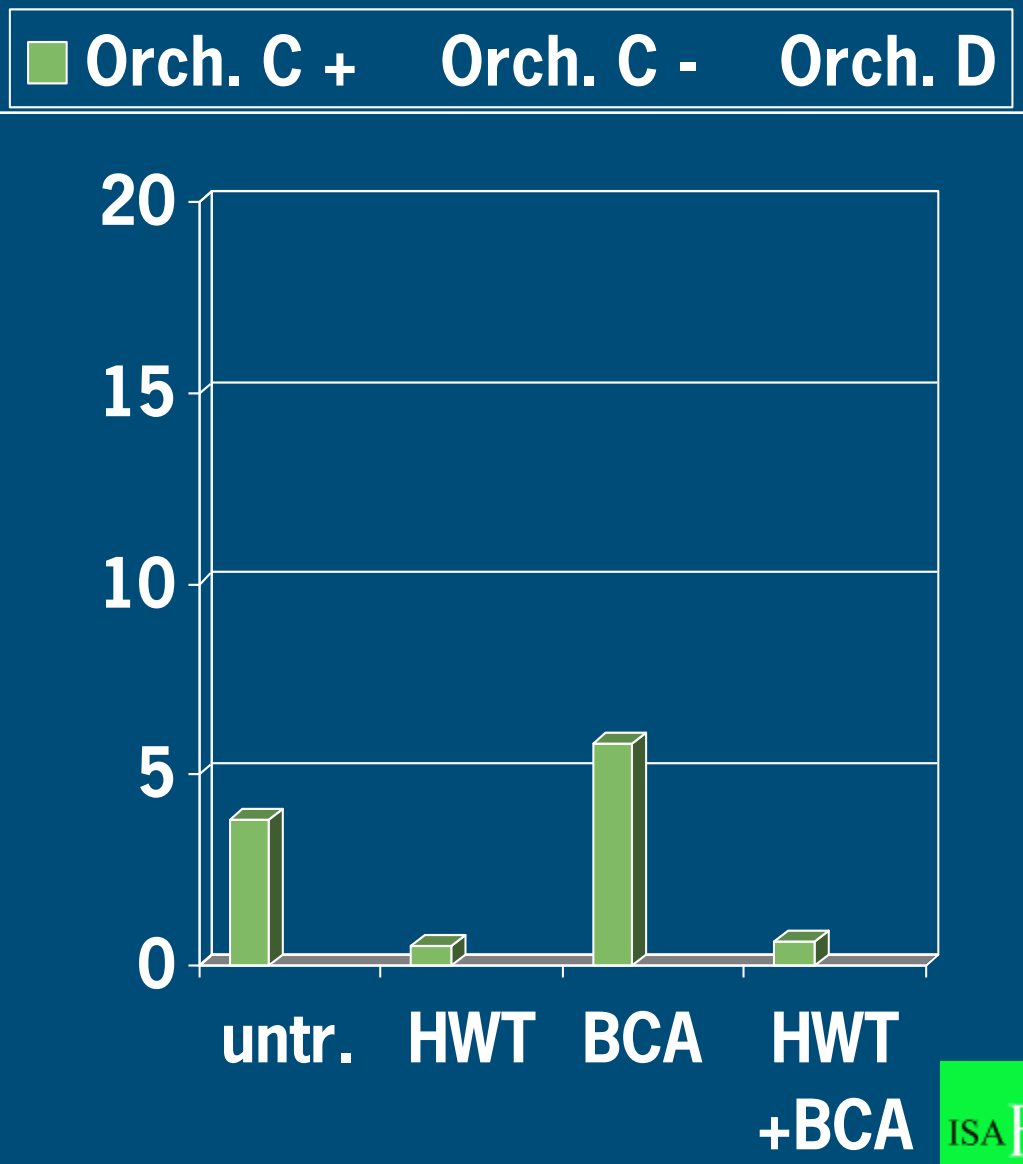
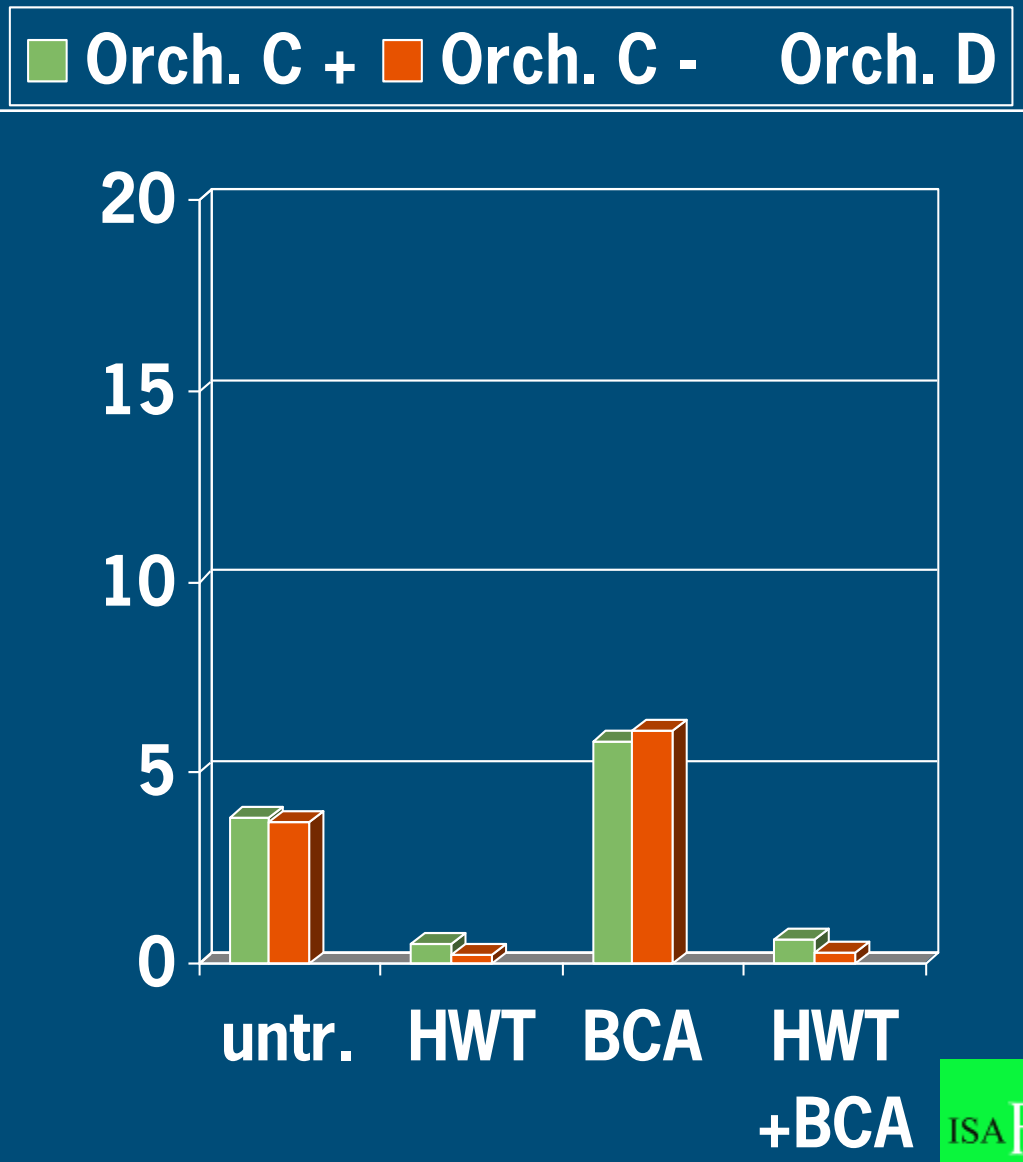
HWT: on a larger scale

Elstar, 07/08, natural infected



Gloeosporium decreased by HWT

Elstar, 07/08, natural infected



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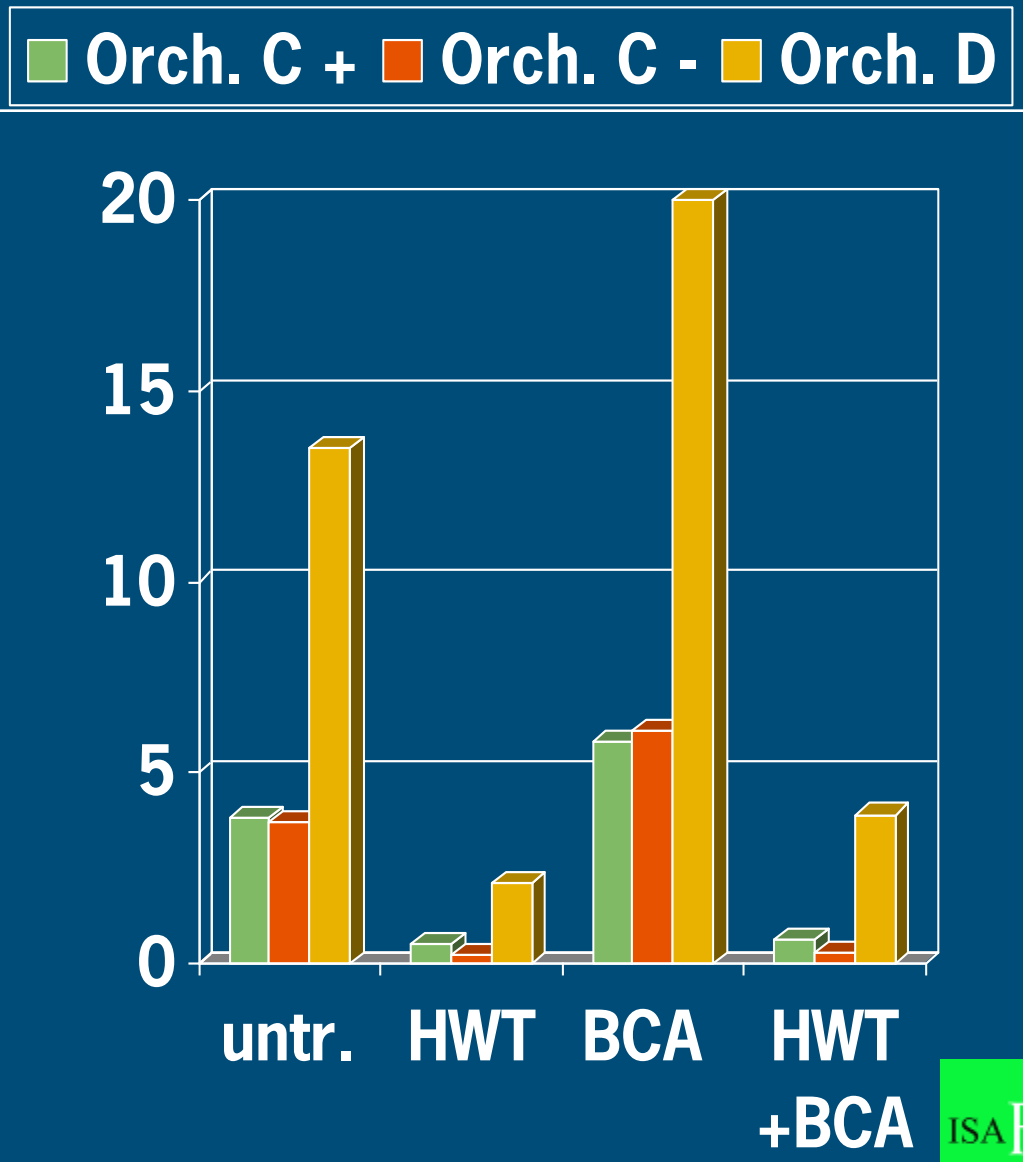
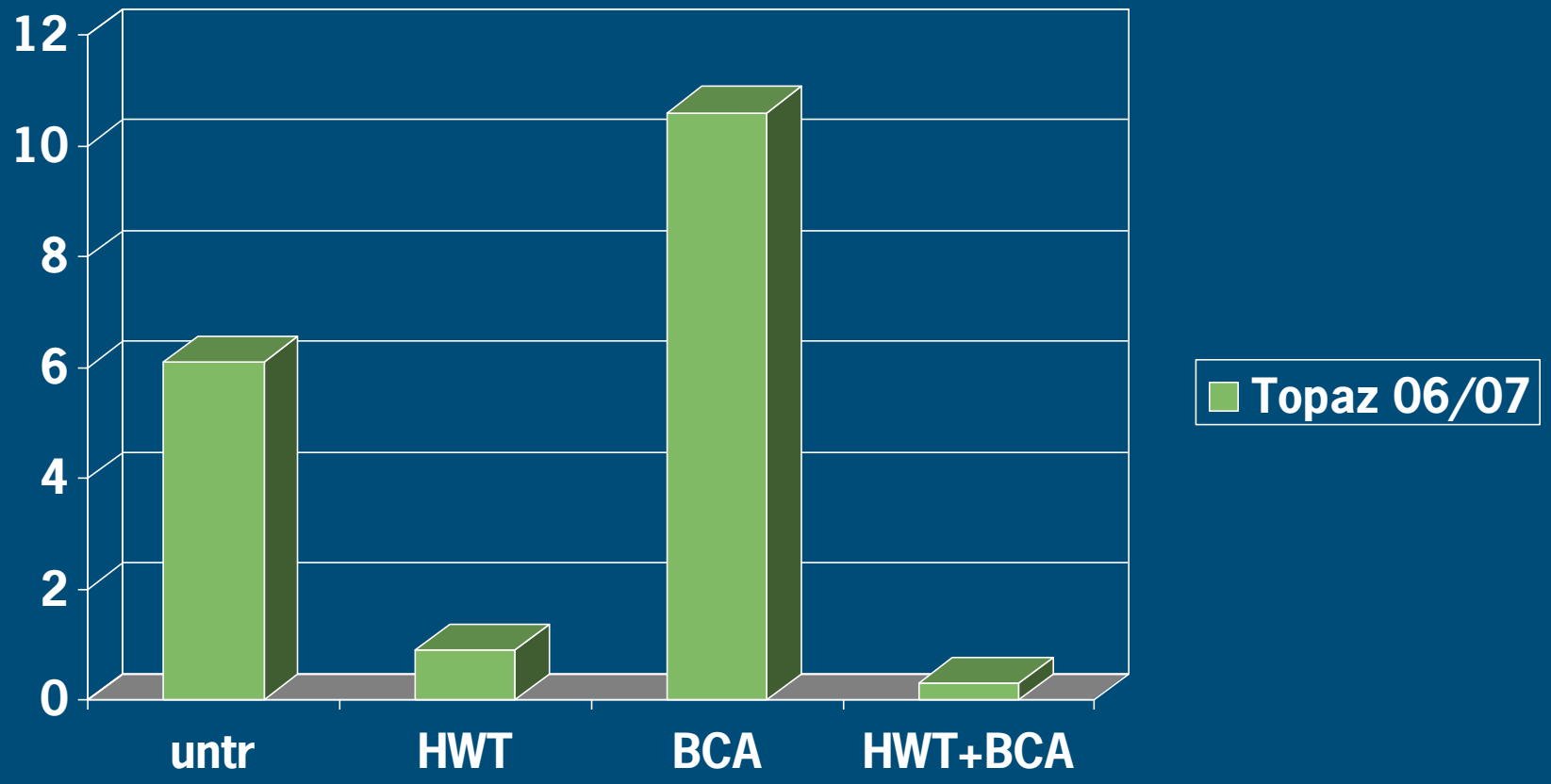


Gloeosporium decreased by HWT

Gloeosporium in Topaz (natural infection)



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Results HWT

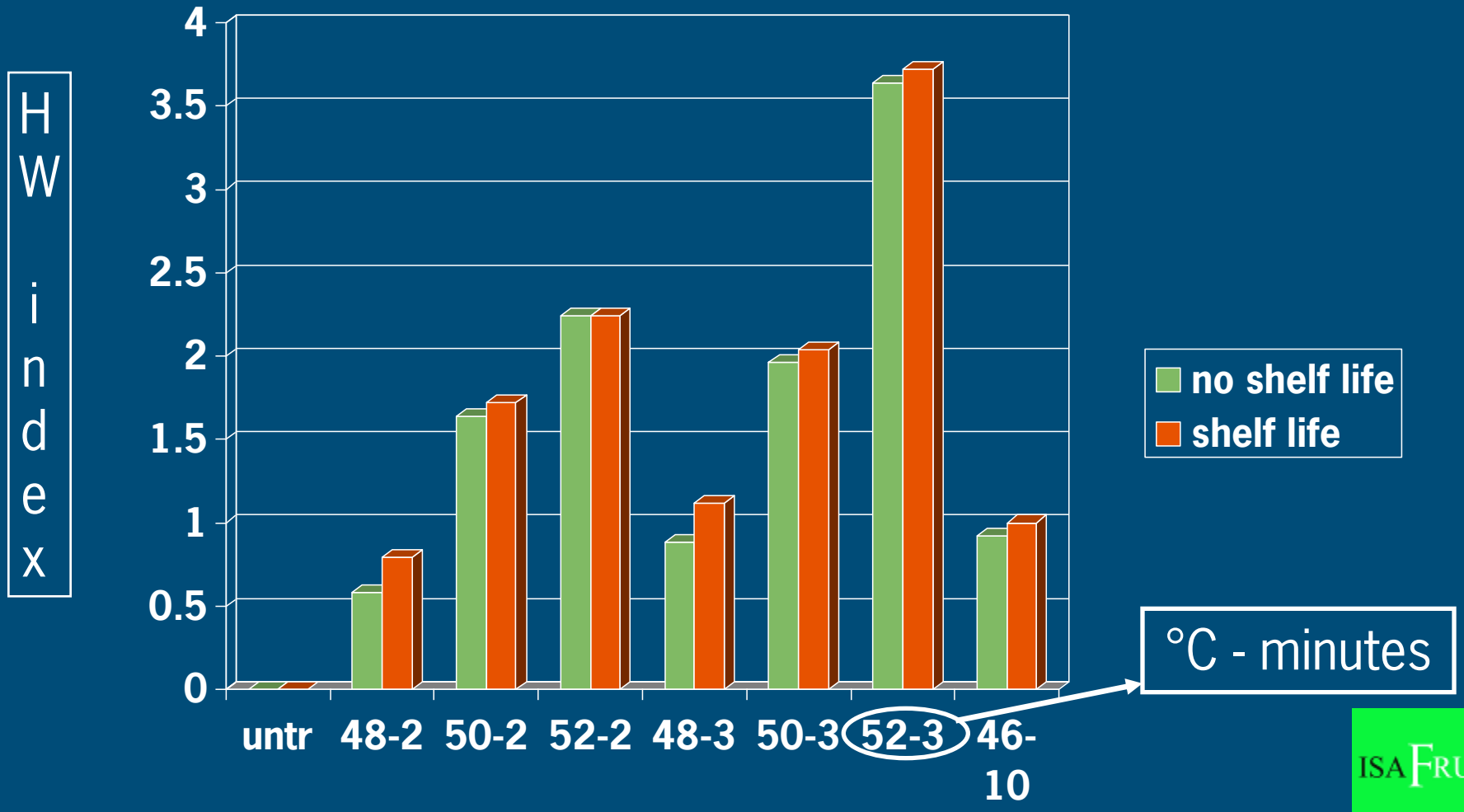
- Elstar: HWT decrease incidence of rots (Bull's eye rot)
- Topaz: HWT same effect
- Elstar and Topaz: Nectria also effect of HWT
- Conclusion: reducing incidence of rots caused by Gloeosporium and perhaps Nectria is possible
- **But:** HWT➔ skin damage

Impression HW damage (Topaz)

0= no damage

5= much damage

HW damage, Topaz, storage till Feb, 7 treatments



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HW treatments, conclusions and discussion

treatments, conclusions and discussion

- Effective against *Gloeosporium album* (Bull's eye rot) and probably *Nectria galligena.*
- HW damage on skin.
- Inoculation experiment: increase of Gray mold infections (Lesions and/or micro flora killed)➔ easier for Botrytis (Gray mold).
- Doubts about common protocol for HWT. At least variety depending.

BCA

- Elstar: BCA effective against Botrytis in inoculation experiment.
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Thank you for your attention!

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