



## II FoodWaStop Conference

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**CA22134**

**Sustainable Network for agrofood loss  
and waste prevention, management,  
quantification and valorisation**

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# **Management of Postharvest Fruit Rot by Cold Storage Combined with Biological Antifungal Compounds**

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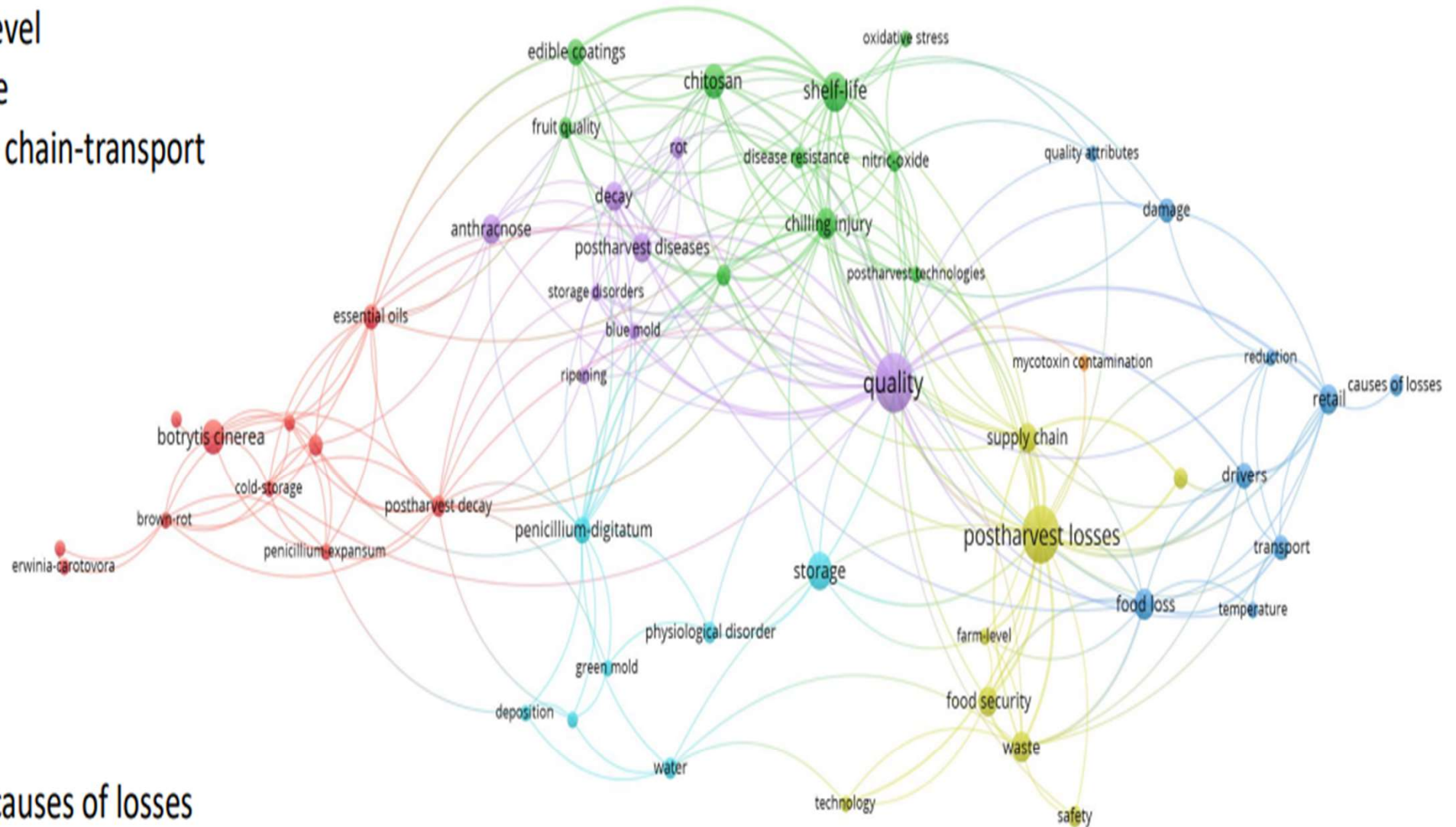
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# Background and context

Postharvest losses mainly occur at

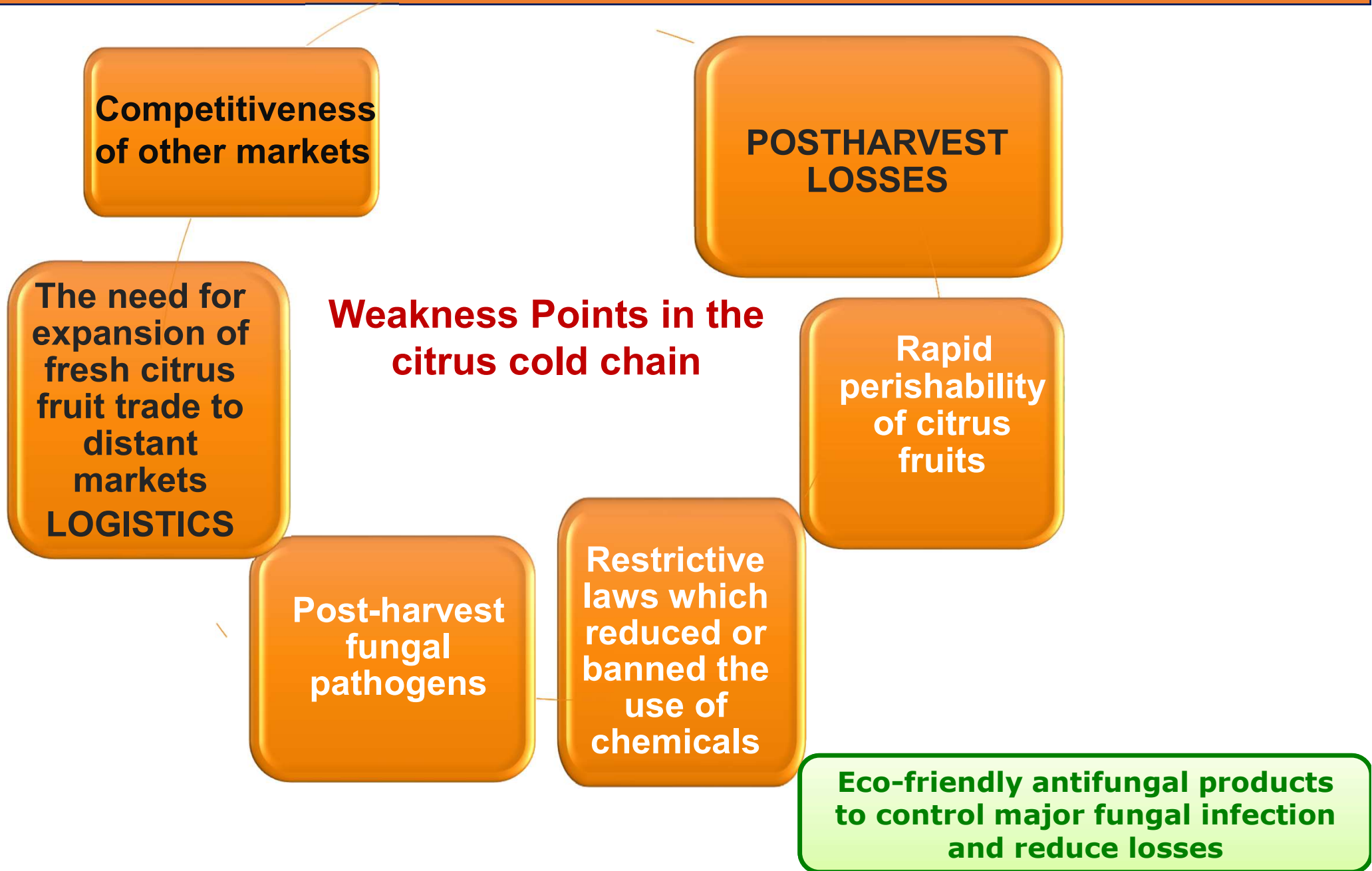
- farm level
- storage
- supply chain-transport



Major causes of losses

- Diseases/rots
- physiological disorder
- Temperature/chilling injury

# Background and context





# Objectives

- ❑ Evaluation of the efficacy of different antifungal compounds for controlling citrus natural fungal infection during prolonged storage.

## PREVIOUS TRIALS

### *In vitro* screening of antifungal agents

Selection of essential oils (EOs), natural extracts, and GRAS salts to inhibit mycelial growth of target pathogens



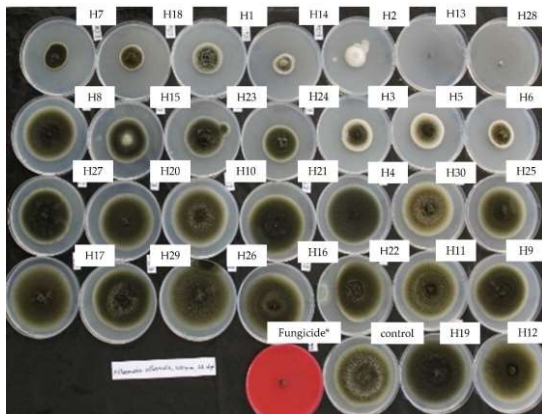
### *In vivo* tests

Assessment of curative activity against postharvest diseases on artificially inoculated fruit incubated at 20 °C



### Cold storage and shelf-life

- Assessment of selected EO GRAS SALT, CHITOSAN to control decay on healthy FRUIT during cold storage.





# Biological Antifungal Compound

## PREVIOUS TRIALS

Agar dilution method GRAS salts	
Sodium metabisulfite (SMB) Ammonium bicarbonate (AMB) Sodium bicarbonate (SB) Potassium dihydrogen	0.2%
Controls	Non-amended PDA plates

(Allagui and Ben Amara, 2024)

Agar dilution method EO activity	
30 EOs	0.05, 0.1, 0.2, 0.3, and 0.4 mg/mL
Controls	non-amended PDA plates

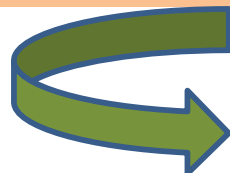
(Allagui et al. 2024)



## PROMISING TREATMENTS !



- Most effective SALT **AMB (2%)**
- EO selected *Syzygium aromaticum* (floral bud of **clove**) **(0.2%)**
- **Chitosan (1%)**



Semi-commercial scale:  
Packinghouses  
Treatments & Cold Storage  
**CONTROLS**

# Treatment & storage cv 'Maltaise'

- **Storage**

30 d at 5°C + one week shelf life (ambient temperature).

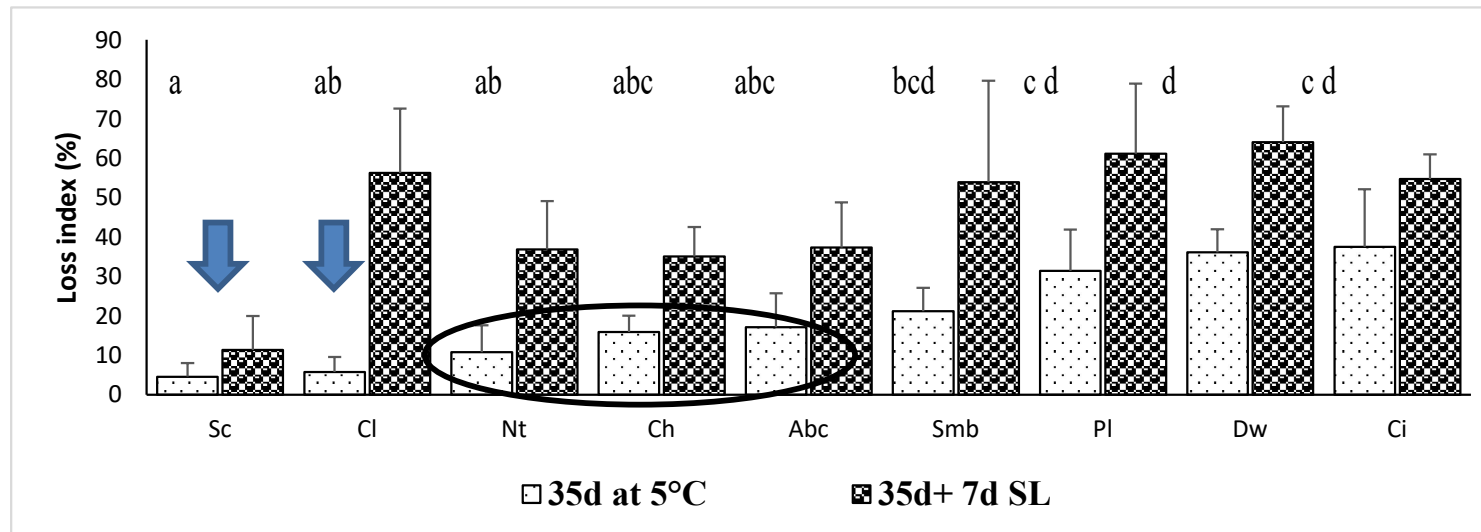
- **Evaluation**

loss index: weight loss (%), incidence (%) and severity of fungal infection (%).

# Main result cv 'Maltaise'

35 days at 5°C and after 7 days shelf life at ambient temperature.

ANOVA : storage(df=1) F-ratio = **67.9\*\***, treatments (df=8) F-ratio = 8.5 \*\*, storage × treatment (df=8) F-ratio = 1.7 ns



After 42 days post-treatment

Loss index was reduced by **50-55%** in other treatments **chitosan, AMB and no treatment**

No significant changes of physico-chemical quality (**Hardness, pH, TSS**) compared to initial values

# Treatment & storage cv 'Valencia late'

- **Storage**

58 d at 5°C + 24d shelf life (ambient temperature)

- **Evaluation**

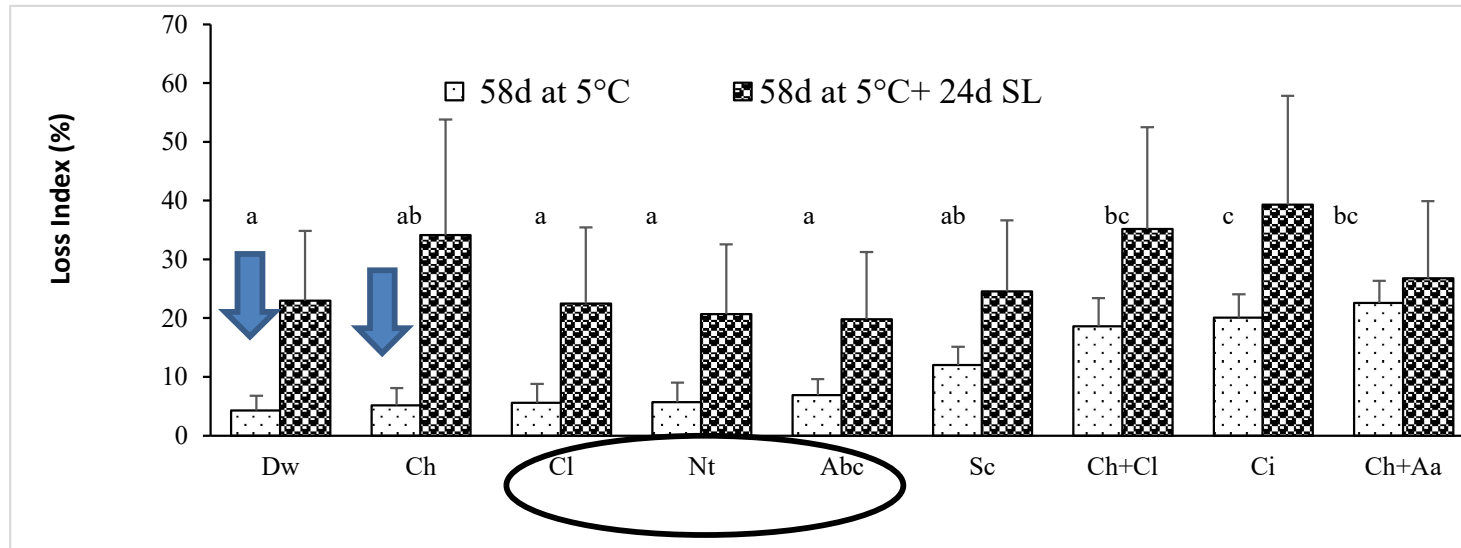
loss index : weight loss, incidence (%) and severity of fungal infection (%)



# Main result cv 'Valencia LATE'

58 days at 5°C + 24 d SL at ambient temperature

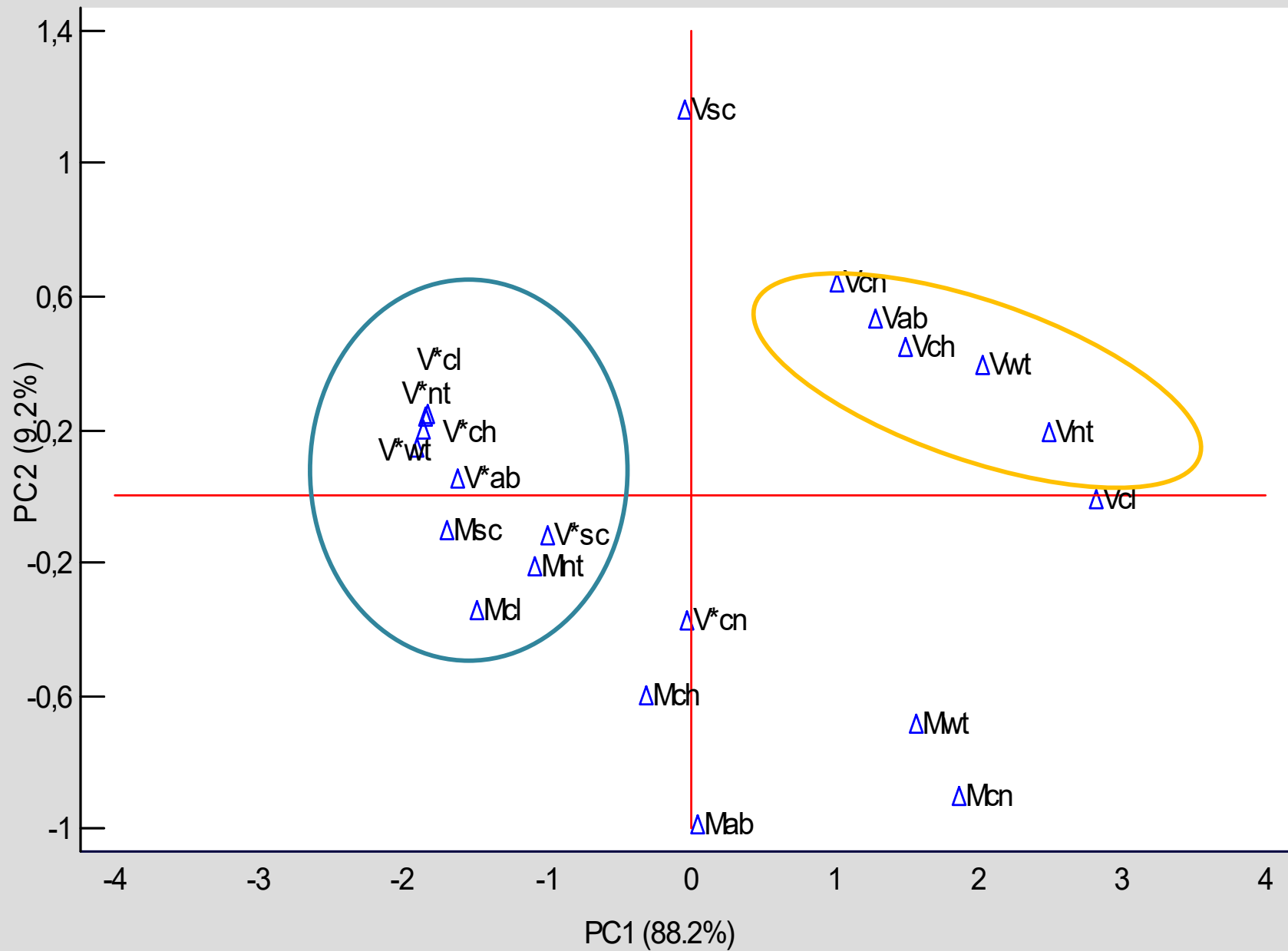
ANOVA : storage(df=1) F-ratio = **65.0\*\***, treatments (df=8) F-ratio = 4.6 ns, storage × treatment (df=8) F-ratio = 1.2 ns



**After 82 days post-treatment**

Loss index was reduced by **78-80 %** in other treatments **CLOVE/AMB** and **no treatment**

# PCA cv 'Maltaise' vs 'Valencia LATE'



# Recommendations

WASTE  
REDUCTION

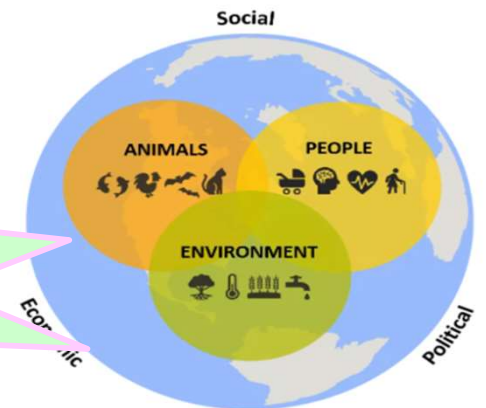
**Ecological alternatives** promising tool for citrus disease management.

FUNGICIDE  
REDUCTION

**Postharvest handling:** discarding wounds, sorting to successful **fruit storage** while limiting fruit prone to fungi after shelf.



Quality  
HEALTH  
APPROACH



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**Thanks for your attention!!**

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