Presentation of a complementary study of Dipl.-Ing. Stefan Huschle

Examination on different Bag-in-Box Packages for Wine-Storage

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Focus of Study

Bag-in-Box Basics

- Developement of synthetics
- Division of synthetics by their structure
  - -Thermoplastics
  - -Duroplastics
  - -Elastomeres
- Manufacturing of synthetics
  - -Extrusion
  - -Moulding

Design of a Bag-in-Box Package

- Synthetic compounds for the production of bags
  - - PE
  - - PET
- Used barrier-materials for the prduction of bags
  - - EVOH
  - - metallised foils
- Tapping Systems

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Storage Trial

Two wines	White Wine / Red Wine				
Three packages	BIB (EVOH)		BIB (metallised)		Glass
Before/after insertion into box	before	after	before	after	
Two storage conditions	15/25	15/25	15/25	15/25	15/25

Analyses after 1, 3 and 6 month

Storage Trial

Analyses after 1, 3 and 6 month - Parameters -

Visual Control

Sensory Evaluation

SO_2-Content

Aromatics (GC-MS)

FTIR-Measurement

Color

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Storage Trial

Analyses after 1, 3 and 6 month - Parameters - - Visual Control

Splashes of wine beside the tap

Damaged EVOH-barrier with visually changed color of the wine (after 3 Month Cool Storage)

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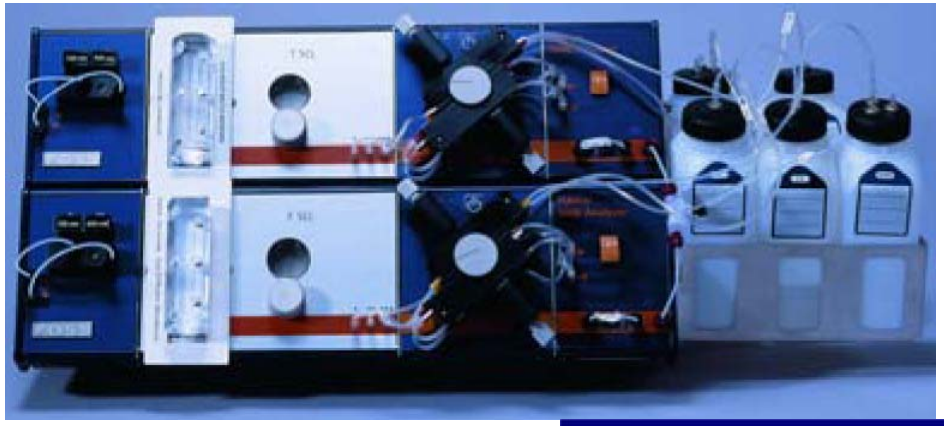
Storage Trial

Analyses after 1, 3 and 6 month - Parameters - - SO_2-Content



SO_2- measurement- system
Foss FIA-Star 5000
(Picture and Table: ETS)

Parameter	F SO_2	T SO_2
Working Range (user variable)	2– 50 mg/L SO_2	5 – 250 mg/L SO_2
Calibration Curve	Linear	Linear
Correlation (RSQ) to Ref. Method	0.9977	0.9939
Repeatability (Std Dev)	0.5	1.0
Through-put (samples/hr)	50	50
Sample Volume	40µL	20µL

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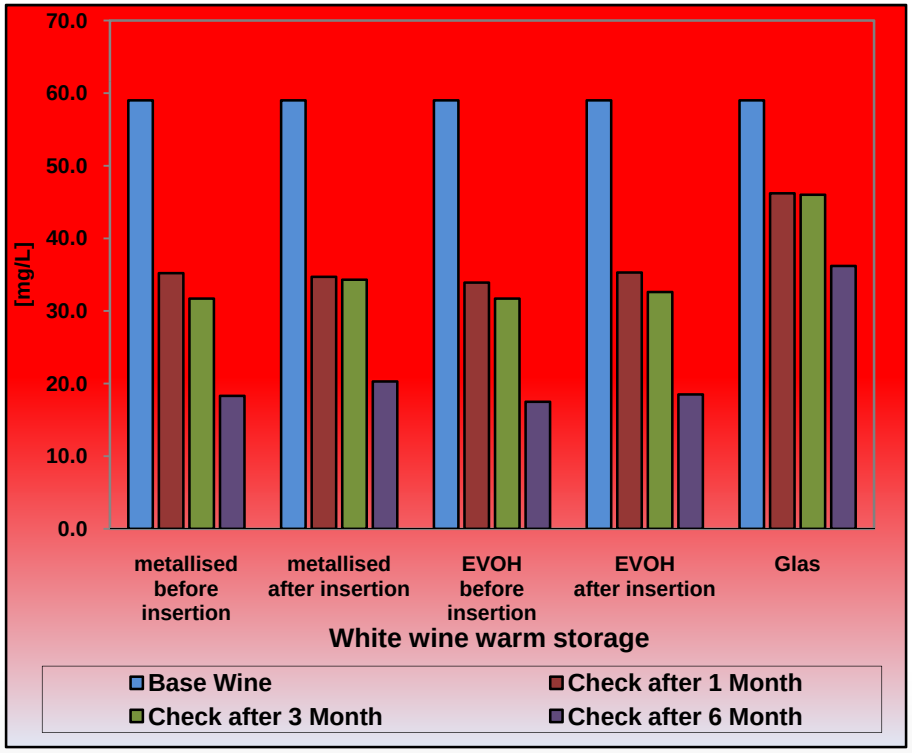
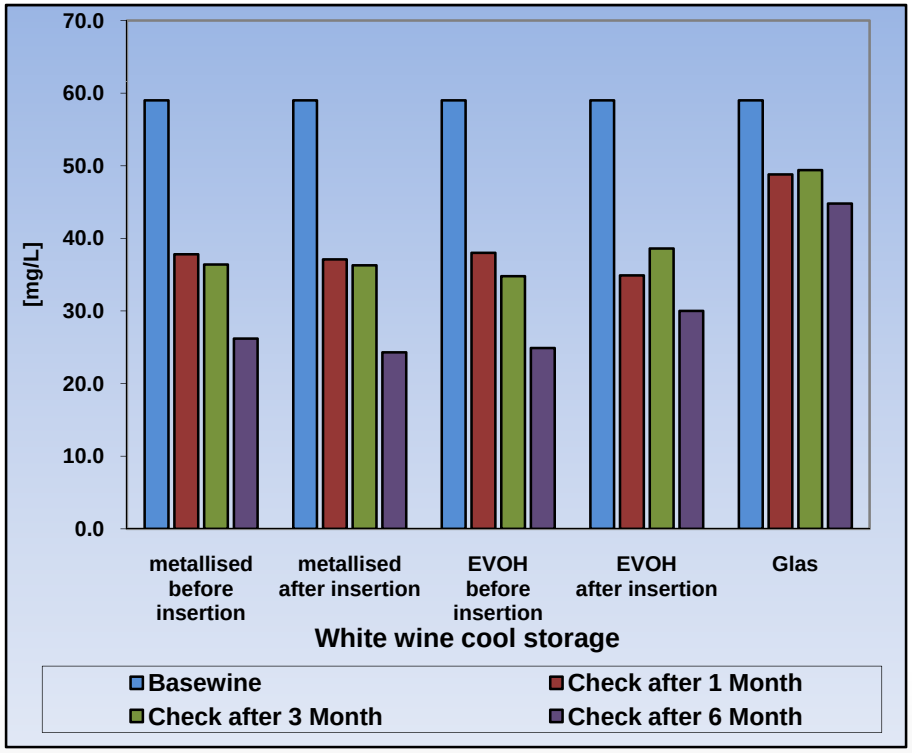
Storage Trial

Analyses after 1, 3 and 6 month - Results - - SO_2-Level





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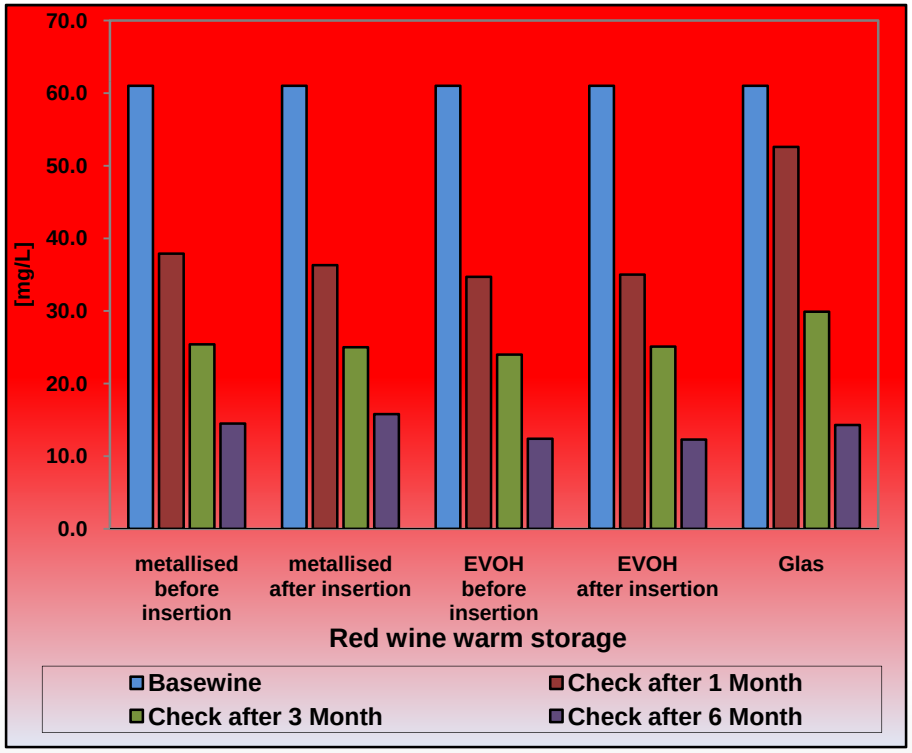
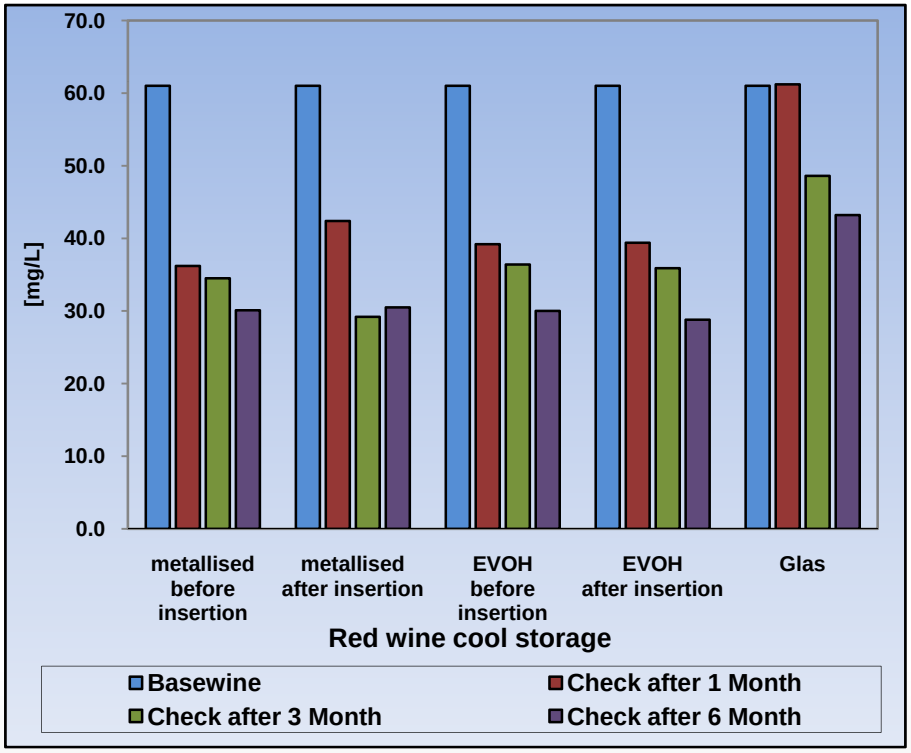
Storage Trial

Analyses after 1, 3 and 6 month - Results - - SO_2-Content





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Storage Trial

Analyses after 1, 3 and 6 month - Parameters- - FTIR-Measurement

FTIR- Measurement- System
Foss Winescan
(Picture WBI Freiburg)

Simultaneous detection of:
- ethanol
- titratable acidity
- pH
- volatile acidity
- reducing sugars
- tartaric, malic, and lactic acids

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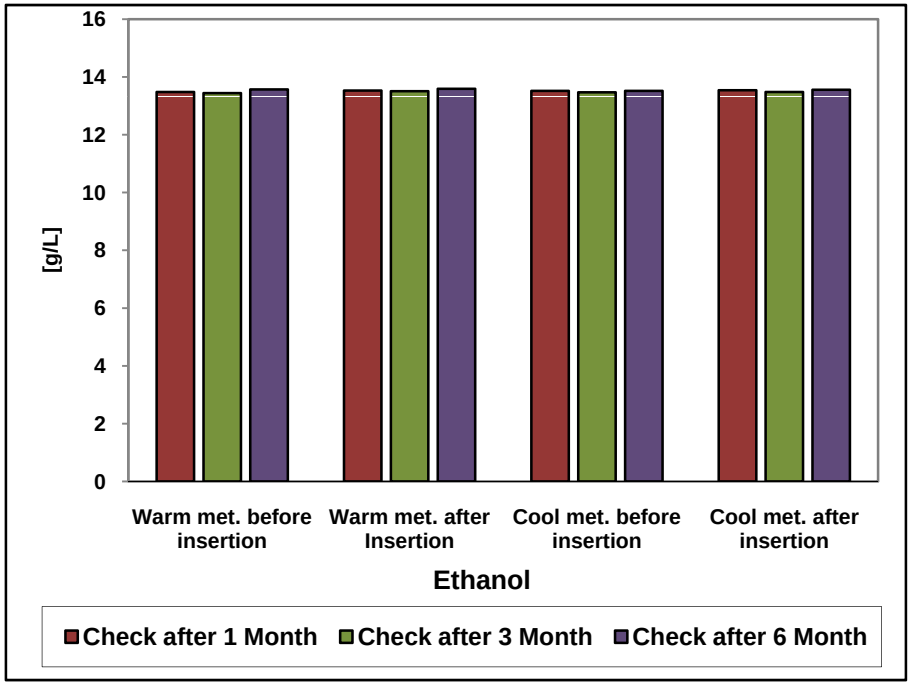
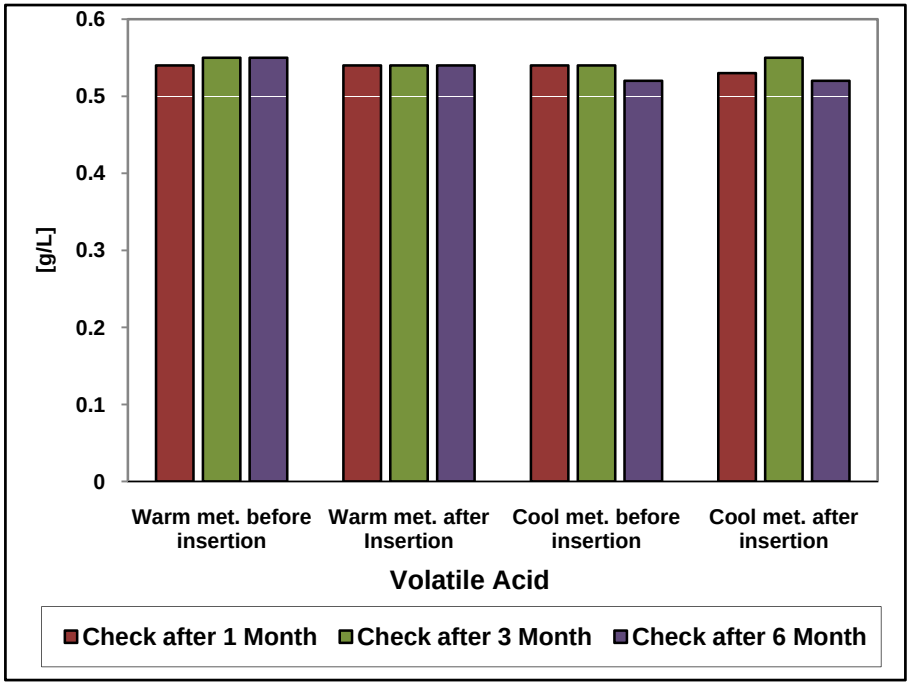
Storage Trial

Analyses after 1, 3 and 6 month - Results (Examples)- - FTIR-Measurement

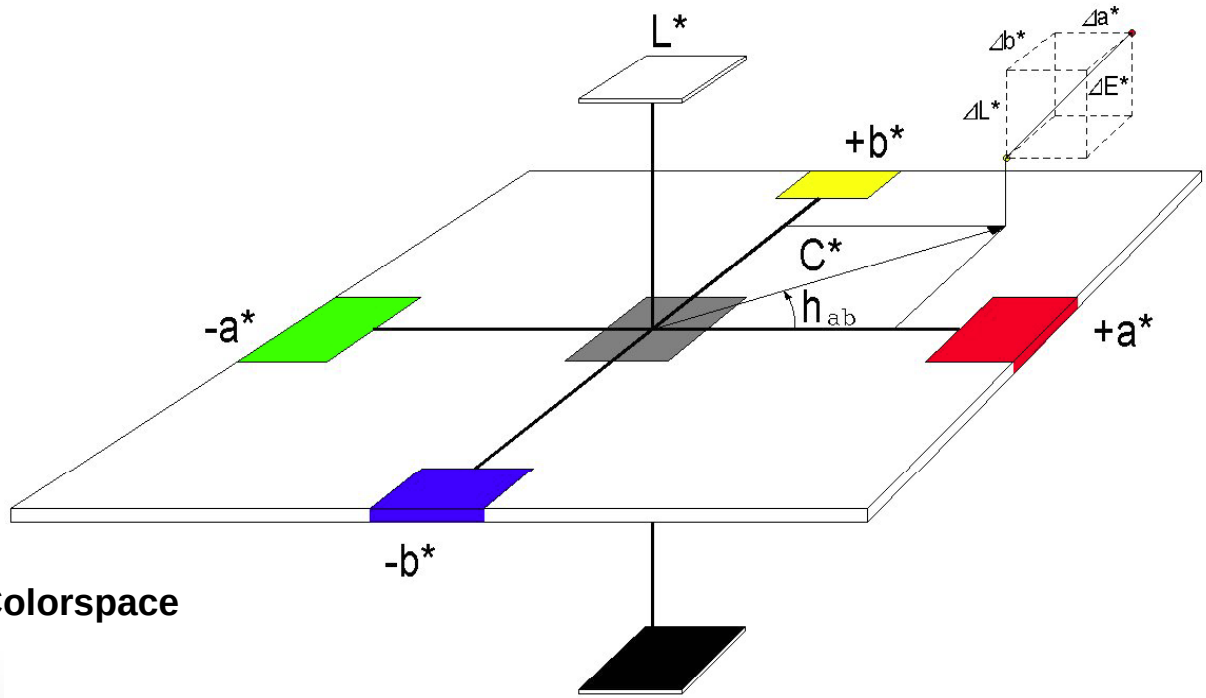




No significant results detected

Storage Trial

Analyses after 1, 3 and 6 month - Parameters- - Color (LAB)



LAB- Colorspace

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Storage Trial

Analyses after 1, 3 and 6 month - Results - - Color (LAB)

- after 1 month: no differences
- after 3 month: no differences
- after 6 month: increase of yellow components (White wines) at warm storage, no differences at cool storage

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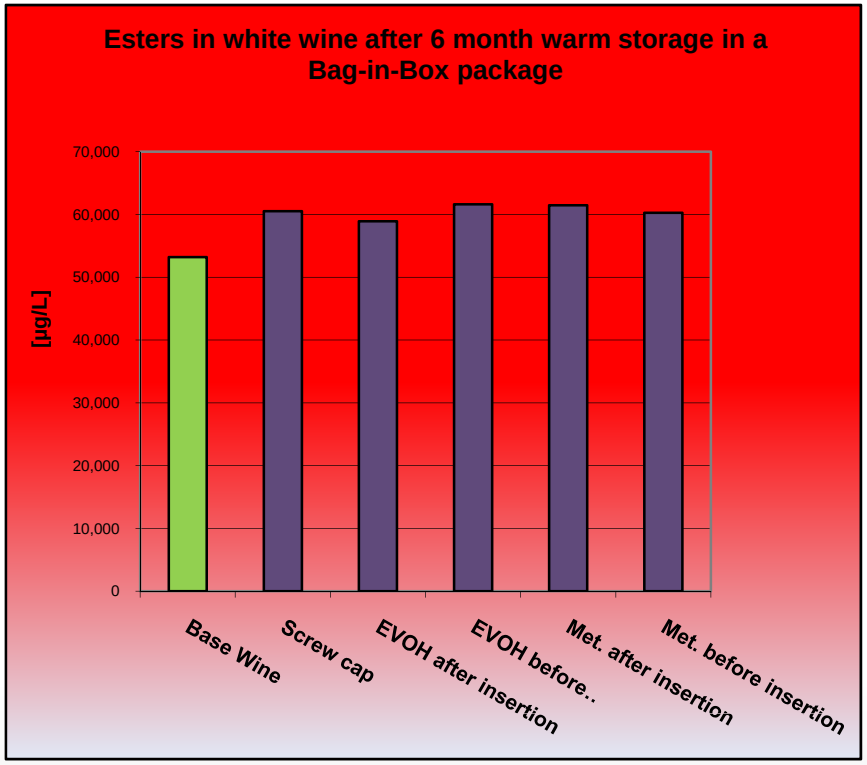
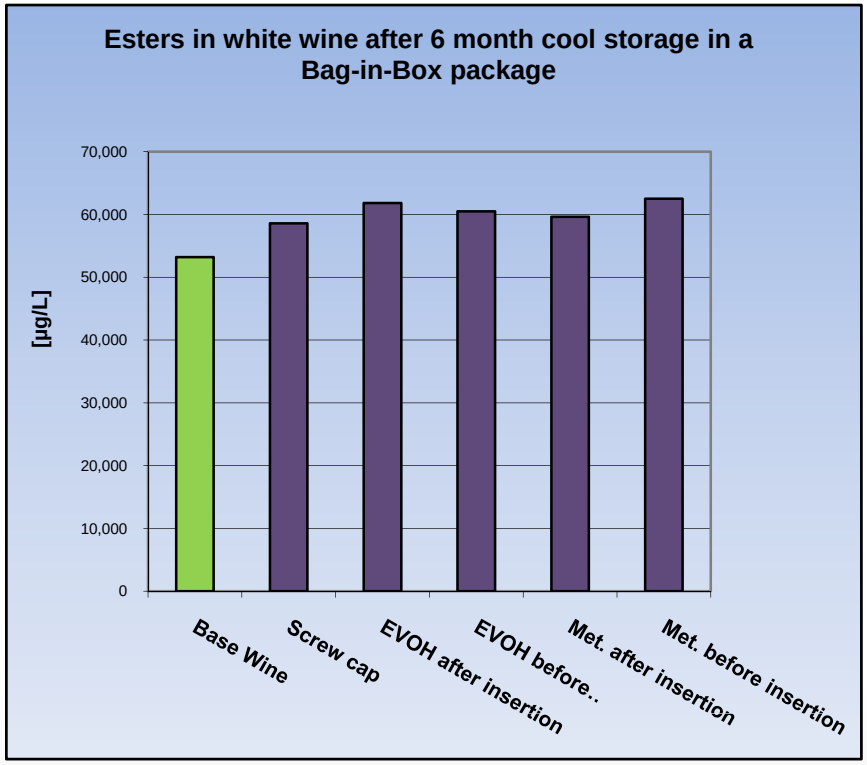
Storage Trial

Analyses after 1, 3 and 6 month - Results - - Aromatics





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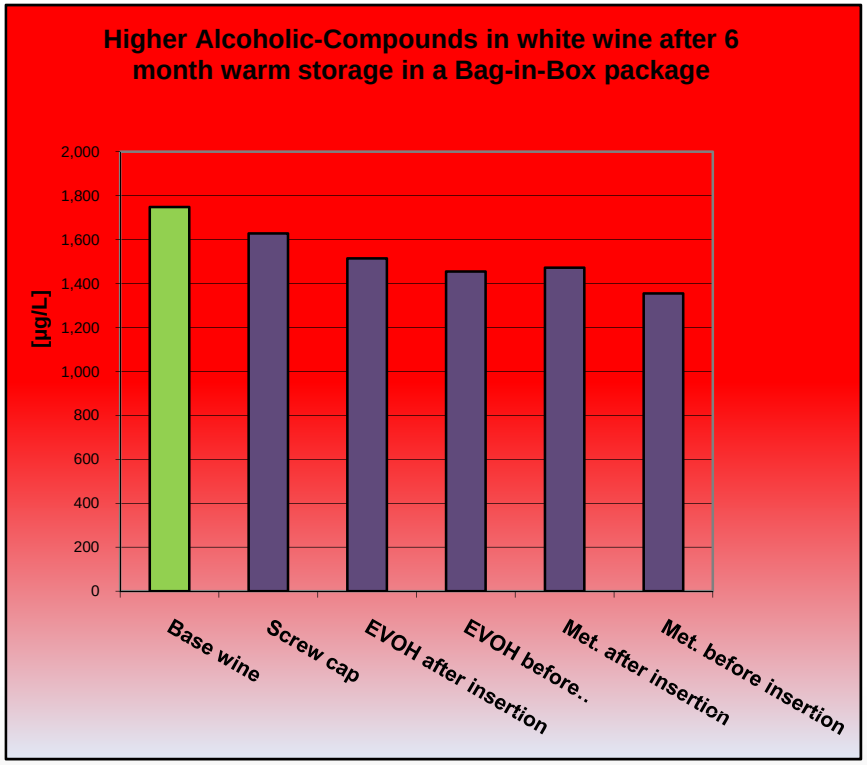
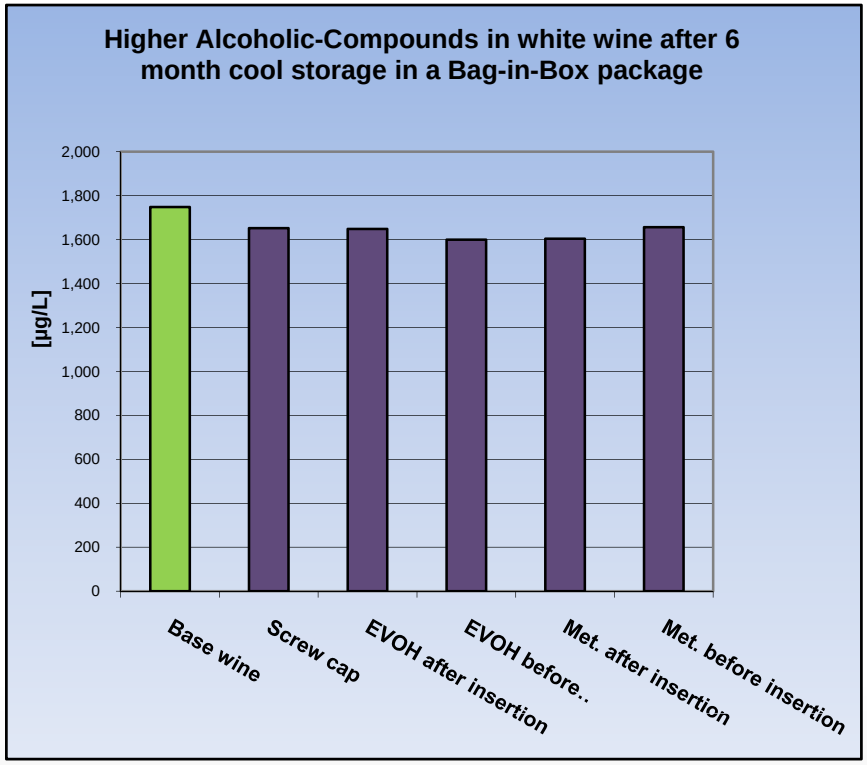
Storage Trial

Analyses after 1, 3 and 6 month - Results - - Aromatics





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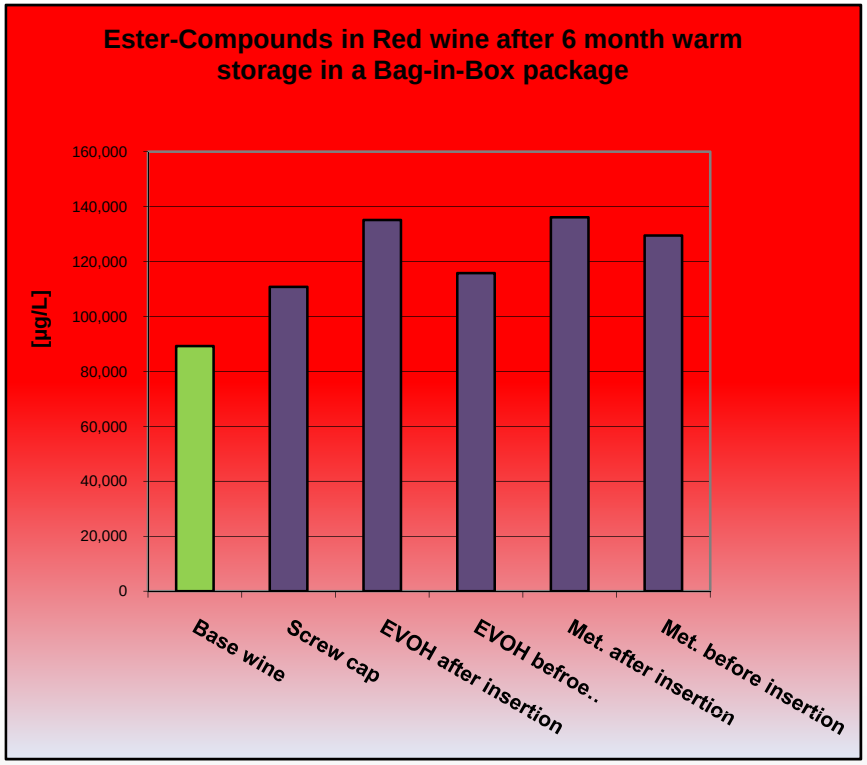
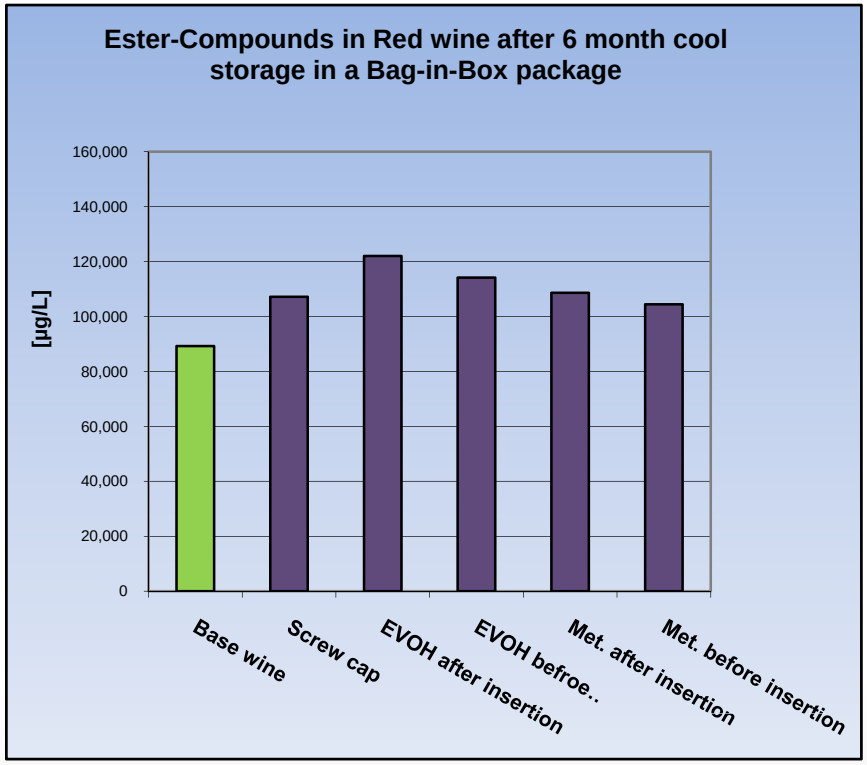
Storage Trial

Analyses after 1, 3 and 6 month - Results - - Aromatics





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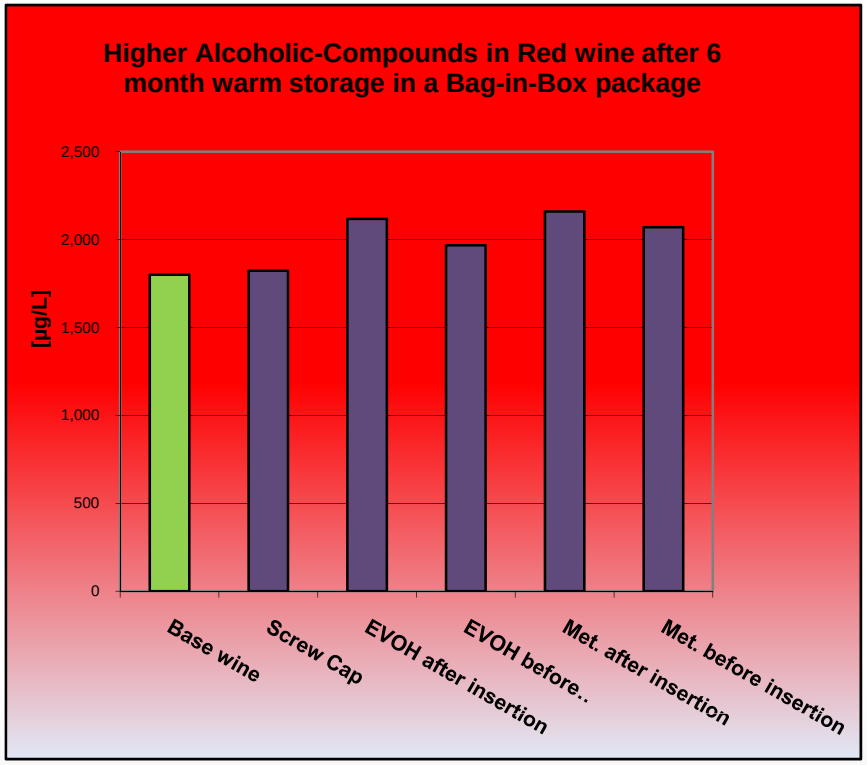
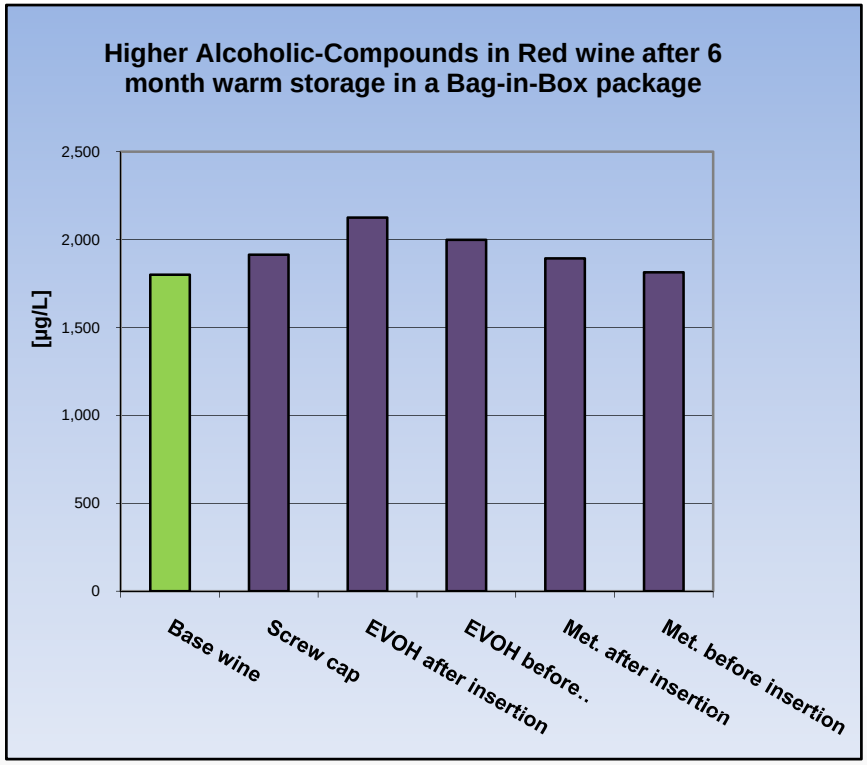
Storage Trial

Analyses after 1, 3 and 6 month - Results - - Aromatics





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Storage Trial

Analyses after 1, 3 and 6 month - Results -

- Sensory Evaluation White- and Red

1. Month
   - no differences between EVOH and metallised foil
   - no difference between BIB and glas with screwcap (Redwines)
   - significant difference between BIB and glas with Screwcap (Whitewines)
     Glass significant worse than all BIB variances probably caused by high SO_2-levels

3. Month
   - no differences between EVOH and metallised
   - no differences between before and after insertion into the box
   - significant Difference between BIB and Glass with Screwcap (Redwines)
     Glas significant worse than all BIB variances
   - significant Difference between BIB and Glass with Screwcap (Whitewines)

6. Month
   - no Differences between EVOH and metallised
   - no Differences between before and after Fall into the box
   - no Difference between BIB and Glas with Screw cap (Red wines)
   - no Difference between BIB and Glas with Screw cap (White wines)

Conclusion

- No significant differences between EVOH and metallised foils

- No influence due to insertion into the Box

- Glass tighter than BIB

- Developement of wine depends mainly on stability of wine before filling (non stable wine will not gain stability in the package)

Thank You