



JKI

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Federal Research Centre for Cultivated Plants

The Harlequin Ladybird *Harmonia axyridis*

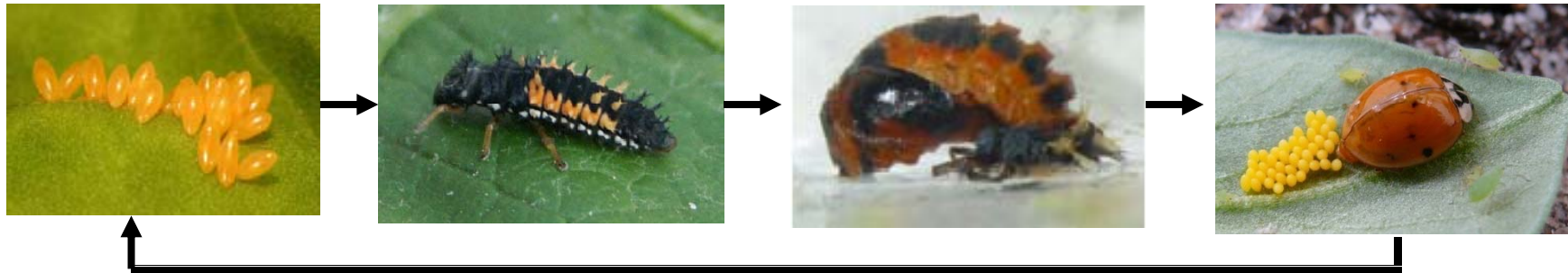
- Sensory thresholds of the “ladybird taint” in wine under different processing conditions

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Harmonia axyridis

- Way of life and life cycle



- Family: *Coccinellidae*
- life-time: up to 3 years (Savoiskaya 1970)
- food range: - Aphids, acarids, Larvae of other beetles, Cannibalism
- fruits and sugar content liquids like honey dew
- Habitat: variabel (Overwintering in burrows and rocks)

Adult characteristics

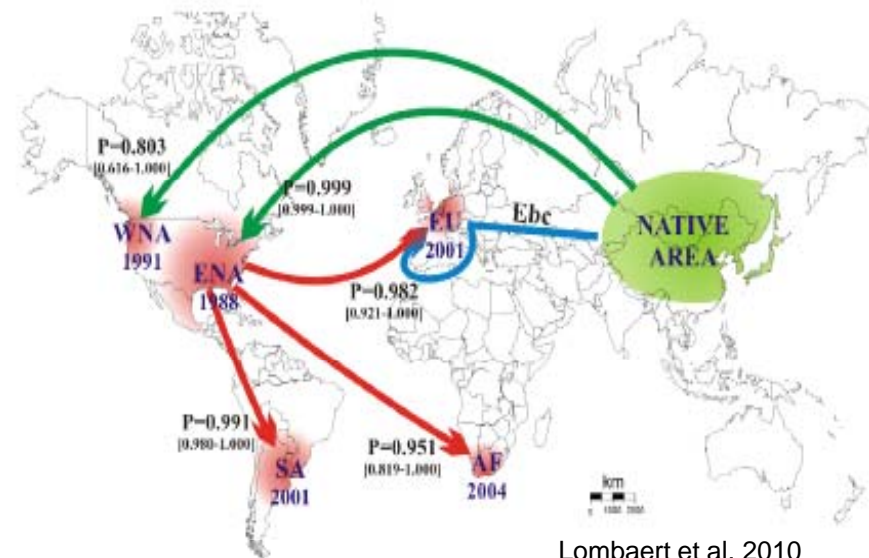


- 6-8 mm
- 0-21 spots
- variabel coloration:
black, orange, red
- W-shaped mark
pronotum
- Not to be confused
with other taxa like 7-
Point



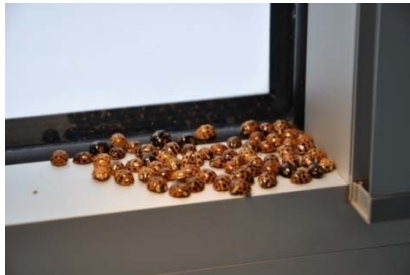
How came the halequin ladybird to Europe?

- First introduced 1982 in South-France as a biological control agent
- Since 2002 Aggregations also in cities of Germany (Hamburg and Frankfurt)
- Spread from Benelux to the adjacent countries



Beneficial or Pest

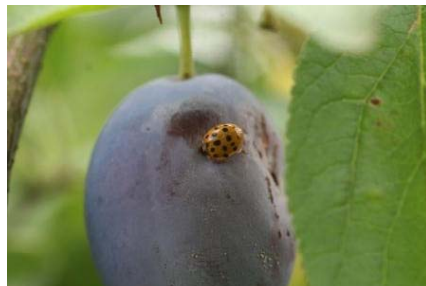
Houses



Native Species



Orcharding



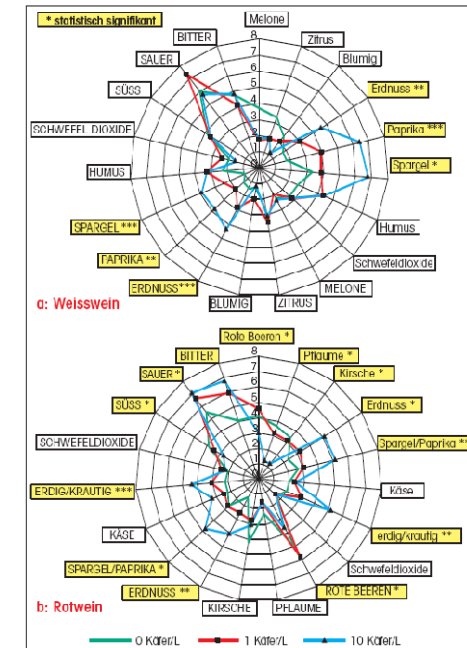
Viticulture



Harmonia axyridis in viticulture

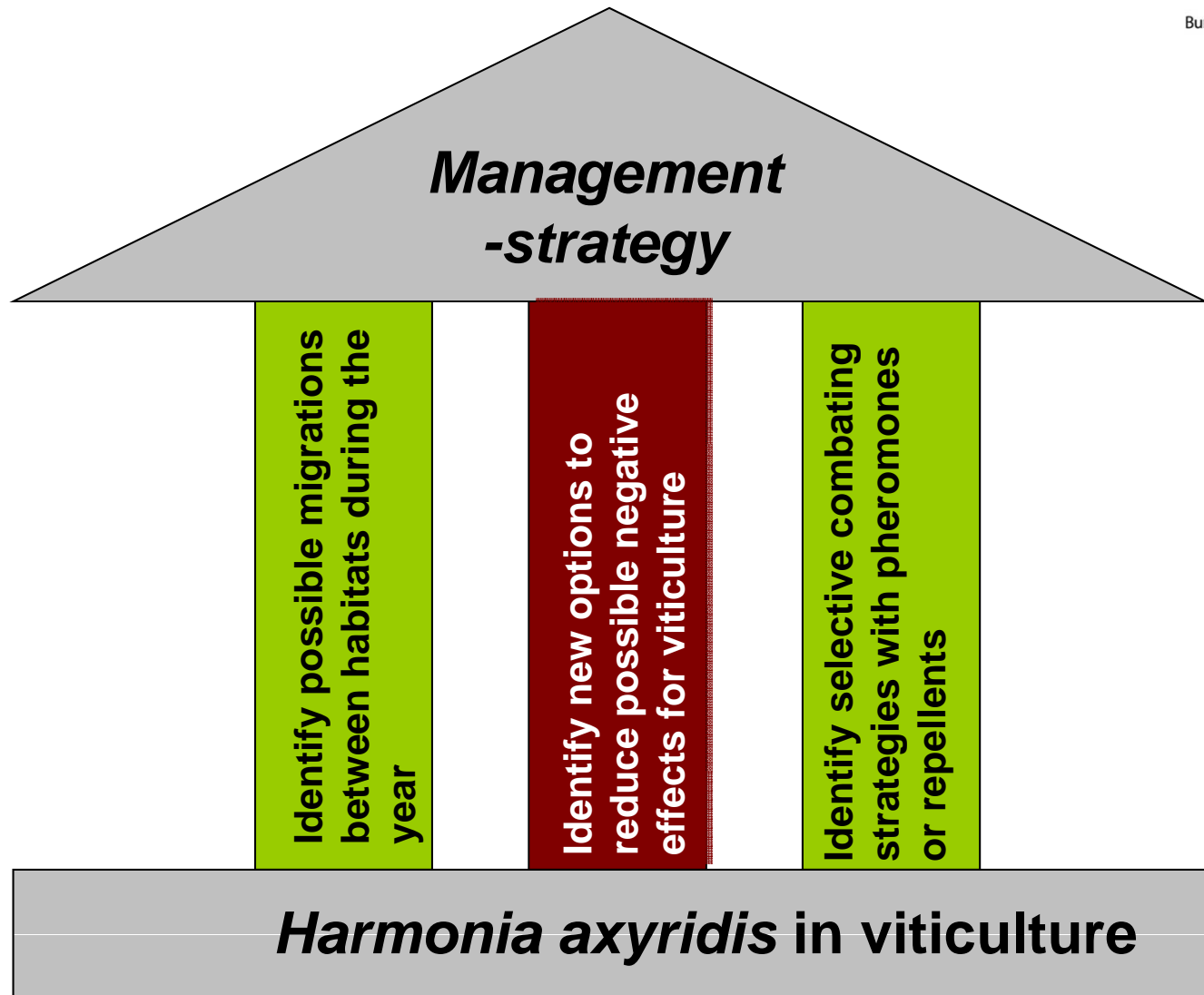


- During harvest the beetles can feed on grapes and may get crushed with them during processing causing release of hemolymph into the must
- The hemolymph of ladybirds contains specific substances of which pyrazine like the 3-isopropyl-2-methoxypyrazine are highly concentrated
- These chemical compounds are responsible for a specific alteration of the smell and taste of wine called “ladybird taint”



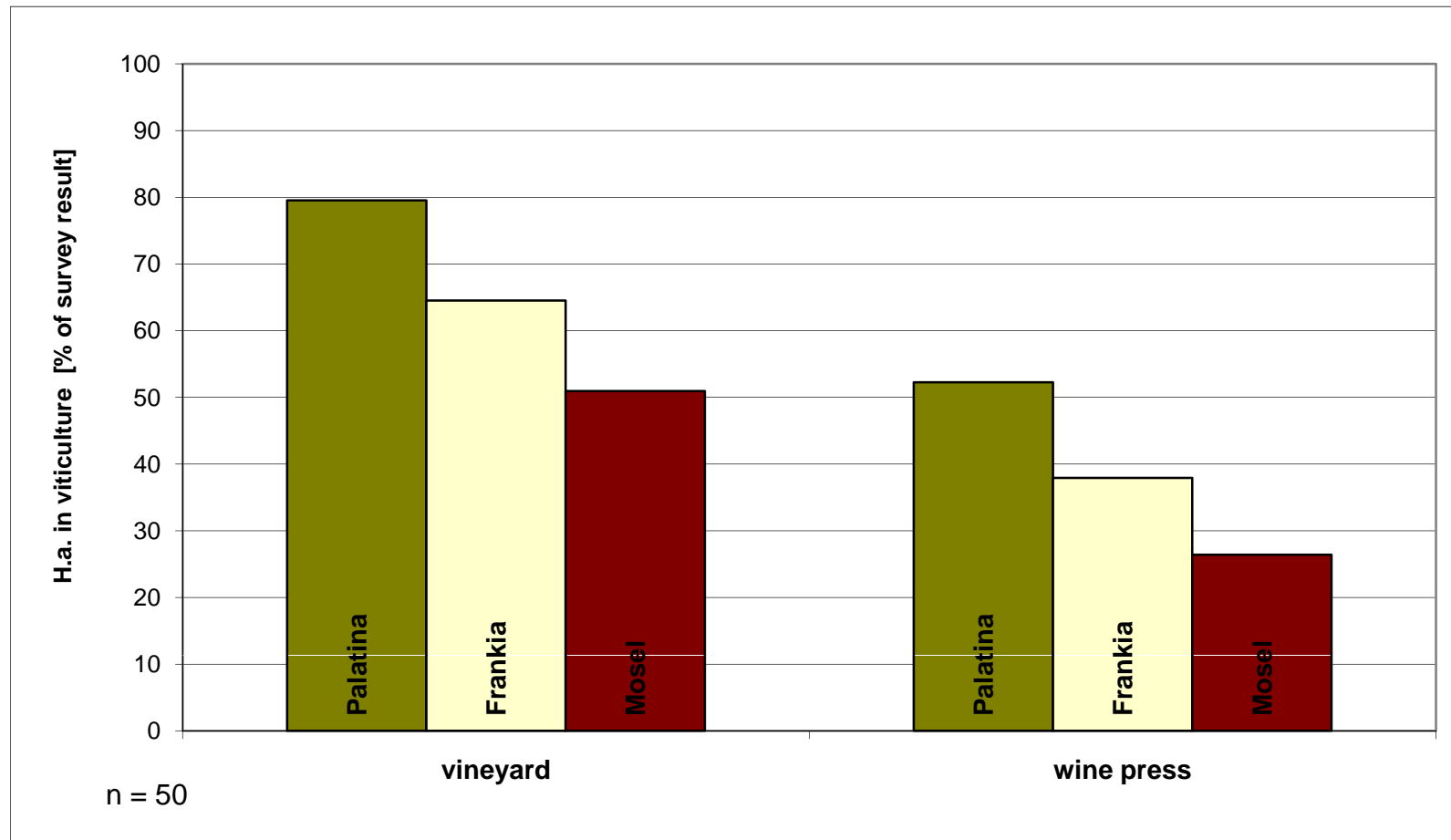
Pickering et al. 2004

The three pillars (=goals) of the Project

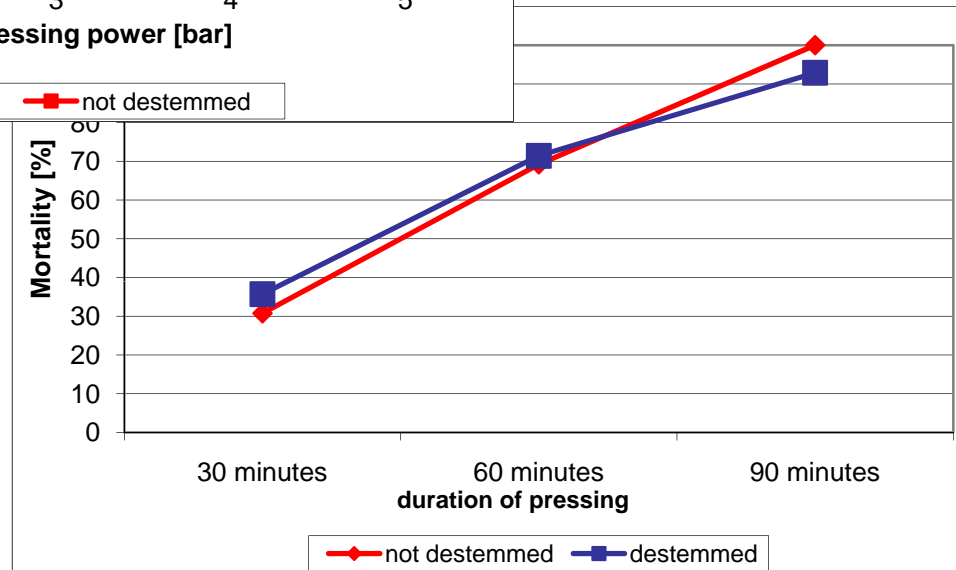
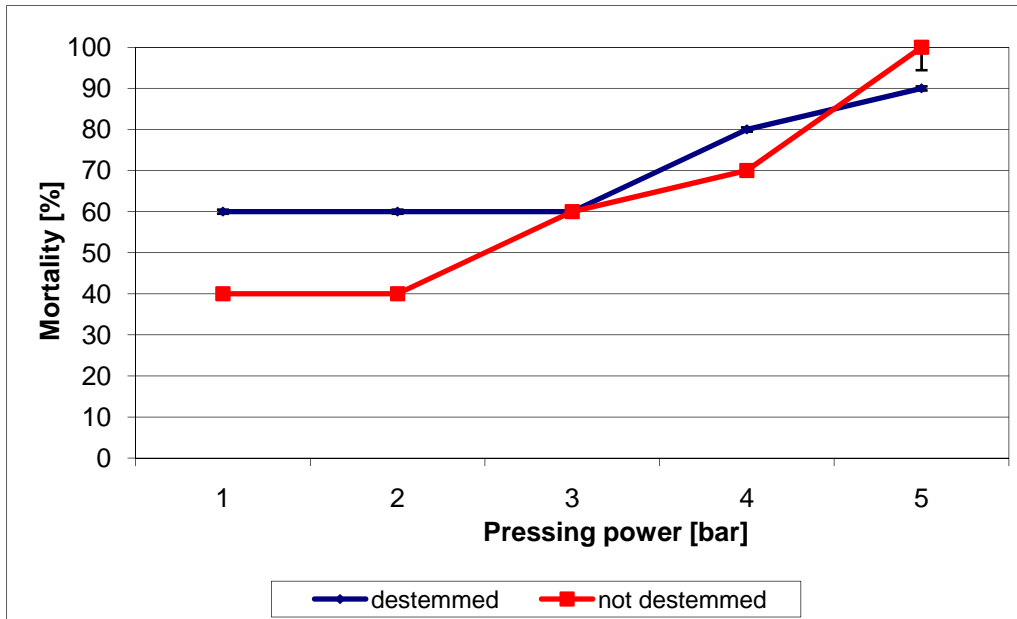


Survey 2009

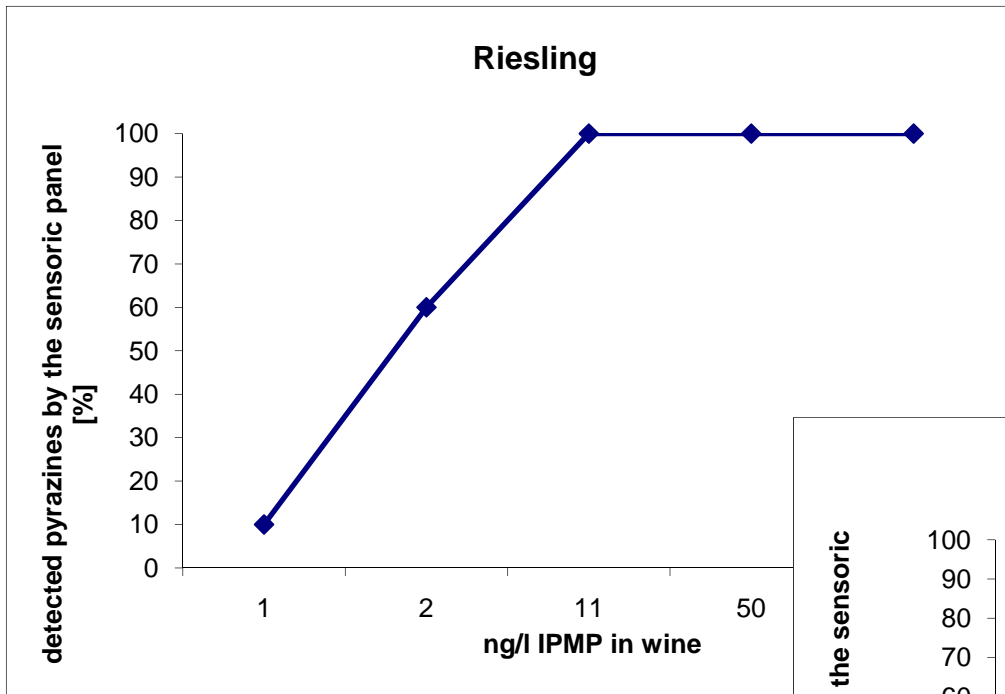
Spotted *Harmonia axyridis* in german regions of viticulture



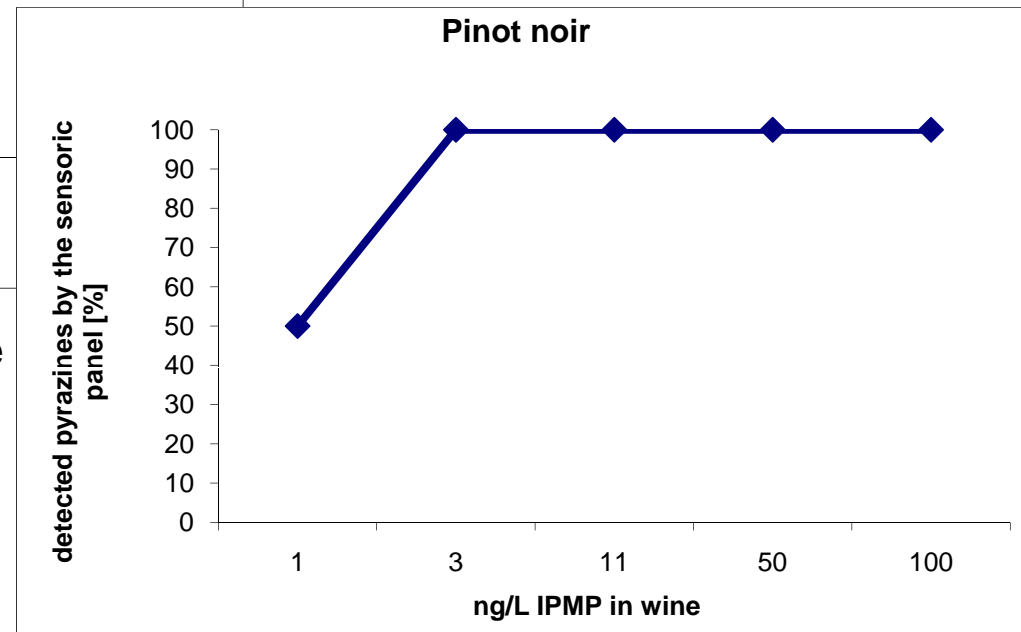
Influence of power and duration of pressing on beetle mortality



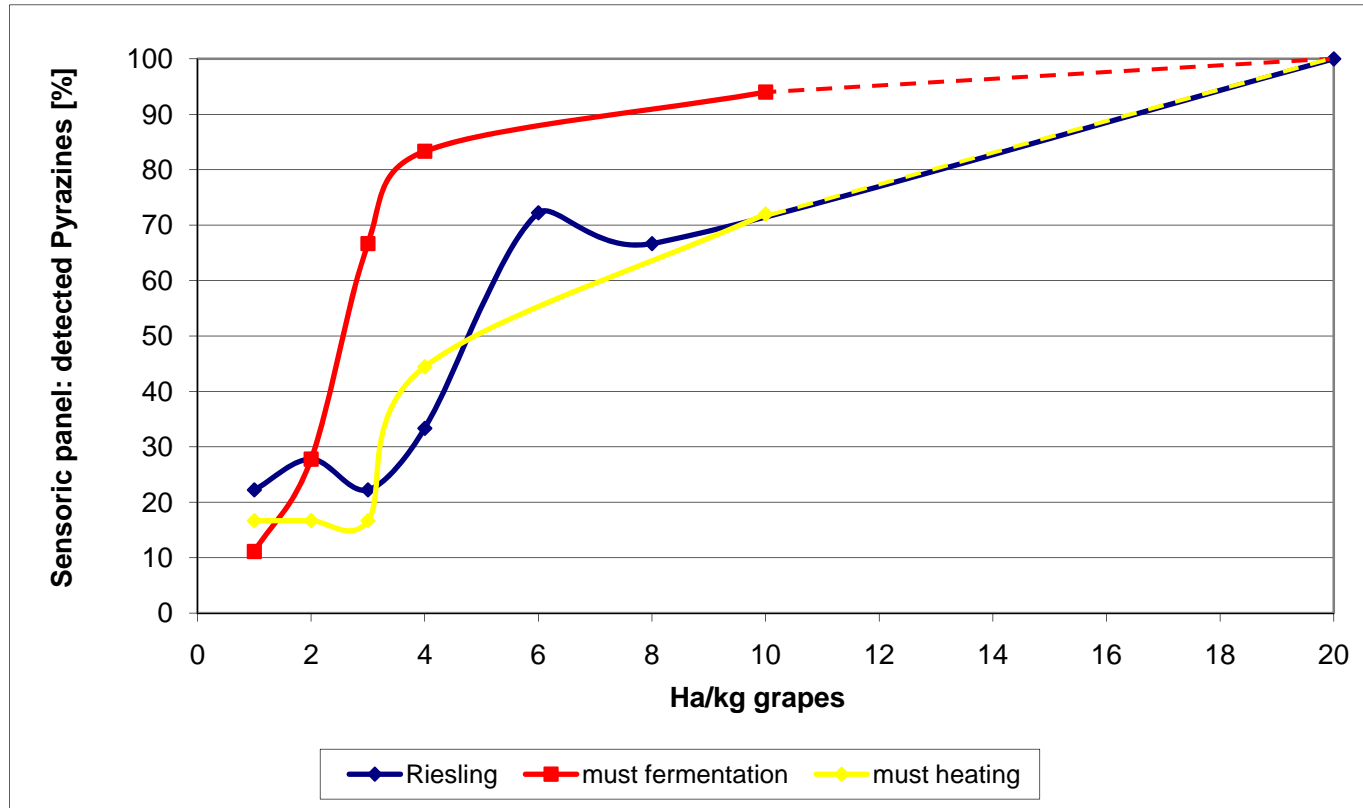
Sensoric threshold of the „ladybird taint“ – ng Pyrazine/L wine



→ Lower sensory threshold in red wine than in white wine



Sensoric threshold of the „ladybird taint“ – beetle per kg grapes



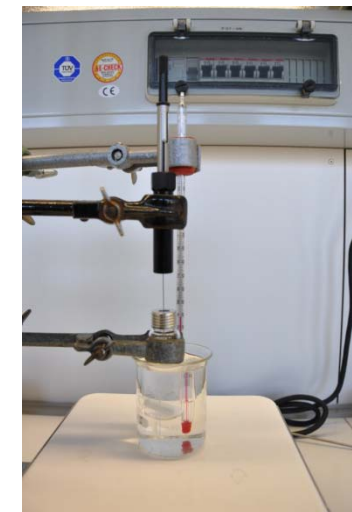
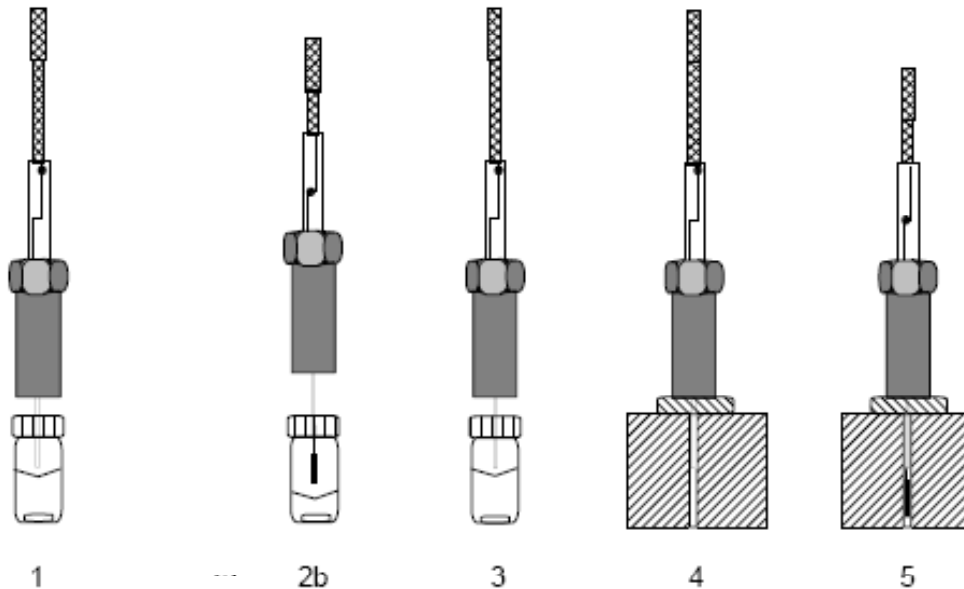
A panel of 10 persons



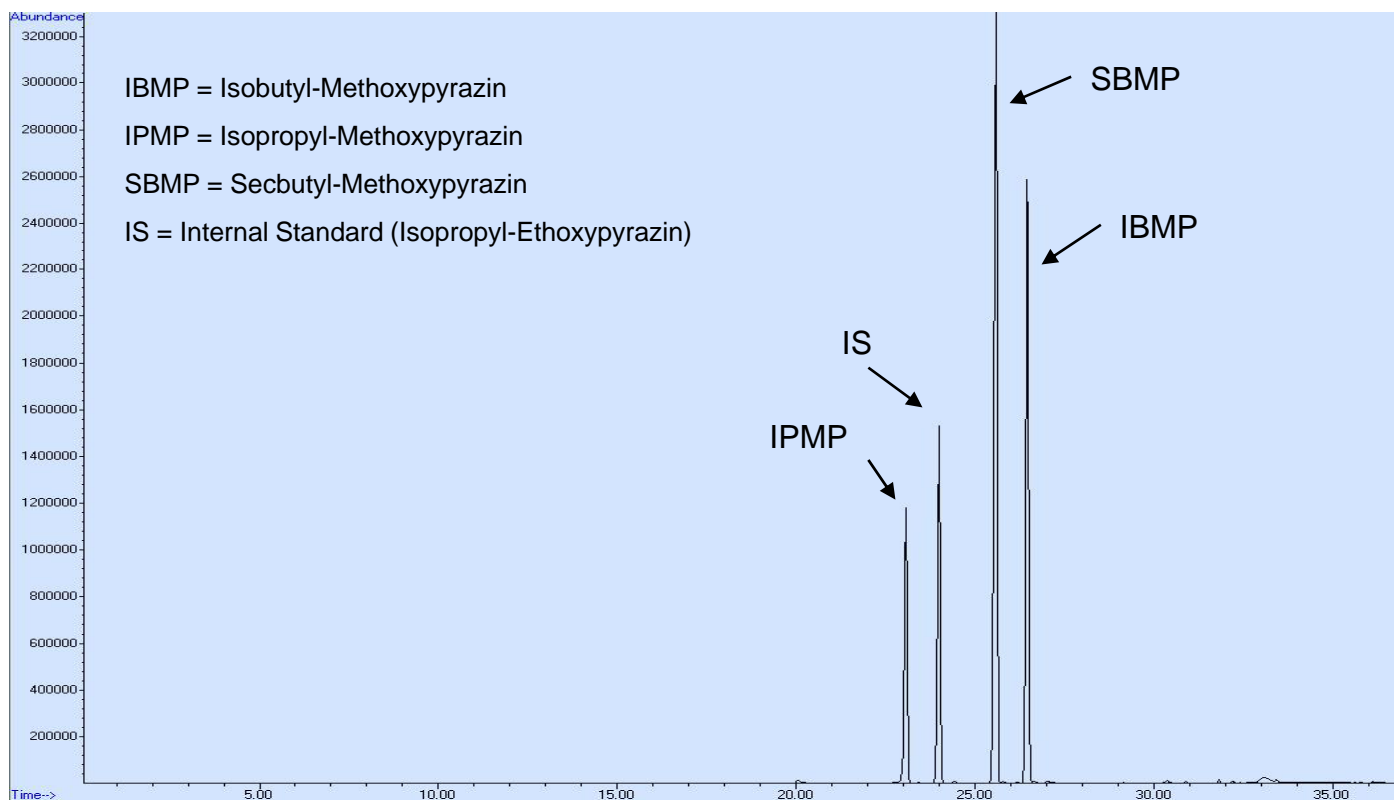
Analyses of Methoxyprazine with HS-SPME-GC-MS

Method

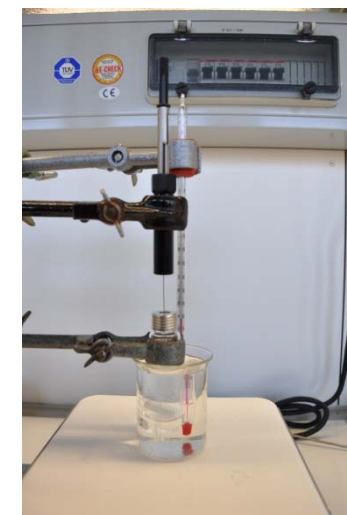
- SPME = Solid Phase Micro Extraction
 - for volatile Substances in low Concentrations (ng/L)
 - high accumulation at the fiber (DVB-Carboxen-PDMS)
 - 5ml vial with 5ml H₂O, 3g NaCl and magnetic stirrer, 30min for coating



Analyses of Methoxypyrazine with HS-SPME-GC-MS



- $r^2 = 0,9493$
- RSD [%] = +/- 8 for IBMP, 14 for IPMP, +/-3 for SBMP
- rate of recovery IS = 100%
- limit of detection: 0,5ng/L



Summary

If there are a lot of *Harmonia axyridis* in harvested crops, we recommend:

for white grapes:

- No destemming
- Low pressing power
- Short duration of pressing



Red grapes:

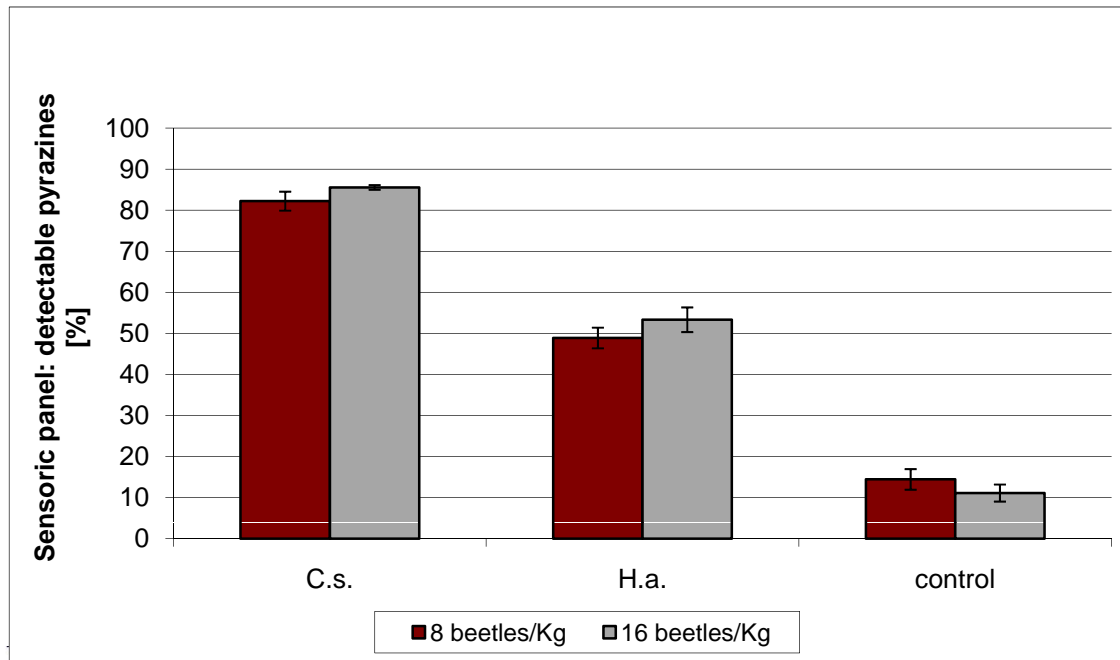
- must heating instead of crushed must fermentation



Outlook:

Does *Coccinella septempunctata* influence the taste of wine, too?

Cudjoe *et al.* 2005: „The concentration of IPMP in the hemolymph of *Harmonia axyridis* is 100x higher than in the ladybird *Coccinella septempunctata*“



Thank you!

