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# Determination of germination capacity of malting barley (*Hordeum vulgare* L.) by single-seed respiration measurement based on novel oxygen-sensing technology

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# AGENDA

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- ▶ Aim
- ▶ Q2 technology
- ▶ Results
- ▶ Perspectives
- ▶ Conclusion

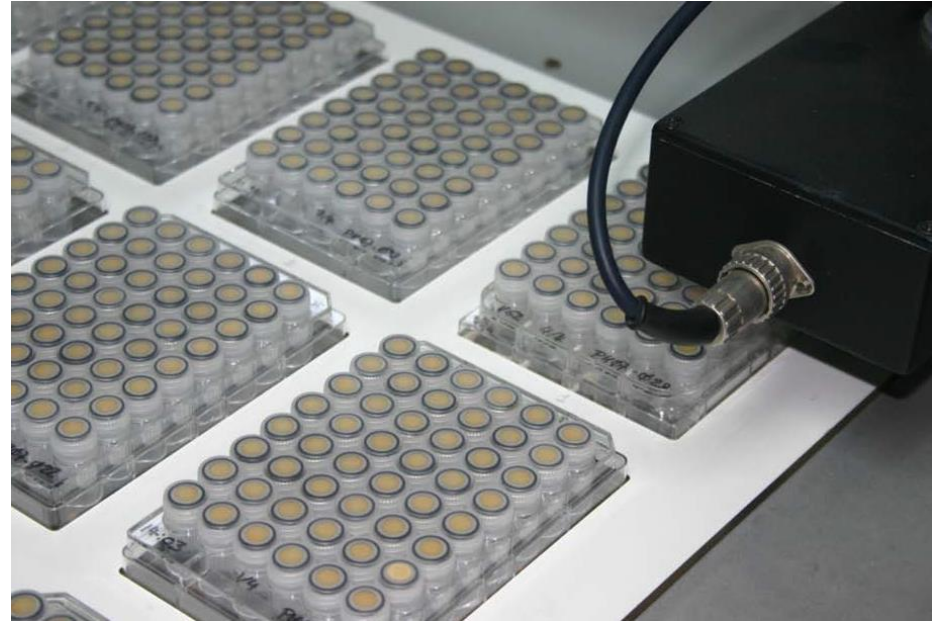
# AIM

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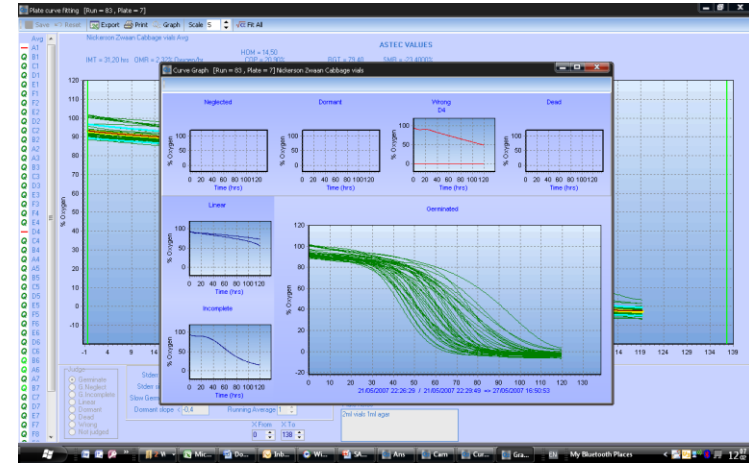
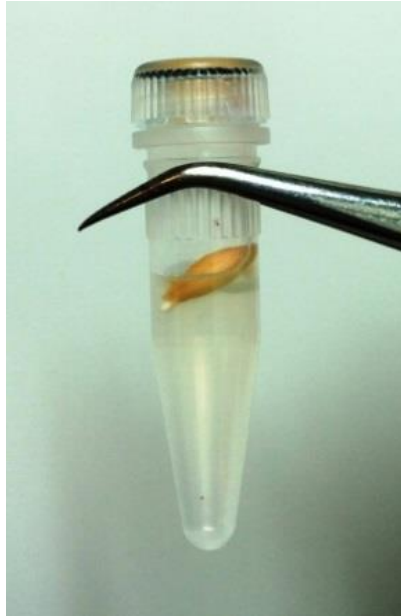
- ▶ Analyze seed vigor of three conventional malting barley seed cultivars by:
- ▶ Traditional implemented laboratory germination method and
- ▶ Novel oxygen sensing technology (Q2)

# Q2 TECHNOLOGY

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# Q2 TECHNOLOGY



# Q2 TECHNOLOGY

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- ▶ Measurement of oxygen consumption during germination (respiration)
- ▶ Oxygen consumption is linked to energy use (vitality)
- ▶ Quick
- ▶ Automatic
- ▶ Many measurement = big data set
- ▶ "objective"

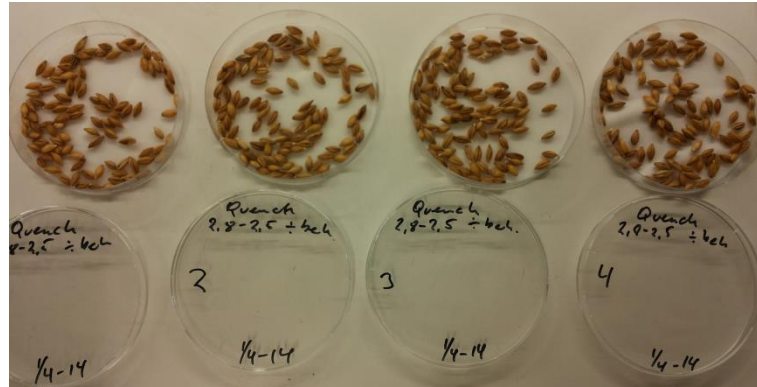
# THE EXPERIMENT

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<b>Columbus (&gt; 2.8 mm)</b>	<b>Columbus (2.8-2.5 mm)</b>	<b>Columbus (2.5-2.2 mm)</b>	<b>Columbus (15 min. heat treatment)</b>	<b>Columbus (30 min. heat treatment)</b>
<b>Quench (&gt; 2.8 mm)</b>	<b>Quench (2.8-2.5 mm)</b>	<b>Quench (2.5-2.2 mm)</b>	<b>Quench (15 min. heat treatment)</b>	<b>Quench (30 min. heat treatment)</b>
<b>Cha Cha (&gt; 2.8 mm)</b>	<b>Cha Cha (2.8-2.5 mm)</b>	<b>Cha Cha (2.5-2.2 mm)</b>	<b>Cha Cha (15 min. heat treatment)</b>	<b>Cha Cha (30 min. heat treatment)</b>

# TRADITIONAL GERMINATION TEST

- ▶ 4 x 100 seeds
- ▶ Petri dish
- ▶ Filter paper
- ▶ 4 ml water
- ▶ Plastic bag
- ▶ 20° C
- ▶ 24 - 48 - 72 hours

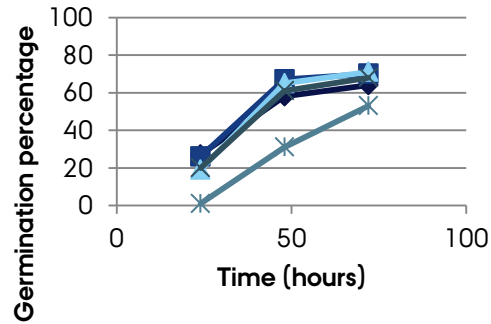




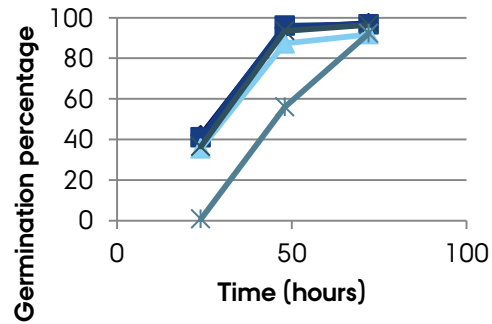
# RESULTS

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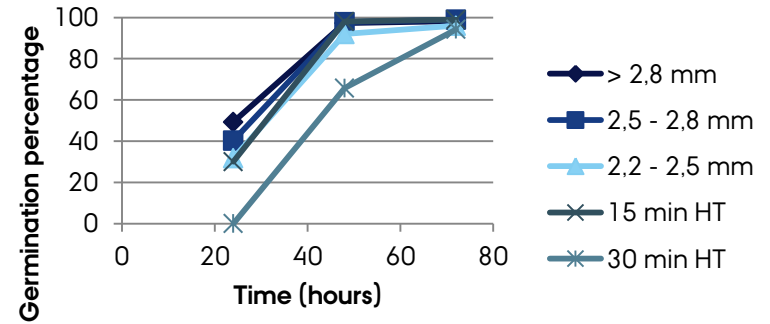
## cv. Columbus



## cv. Quench

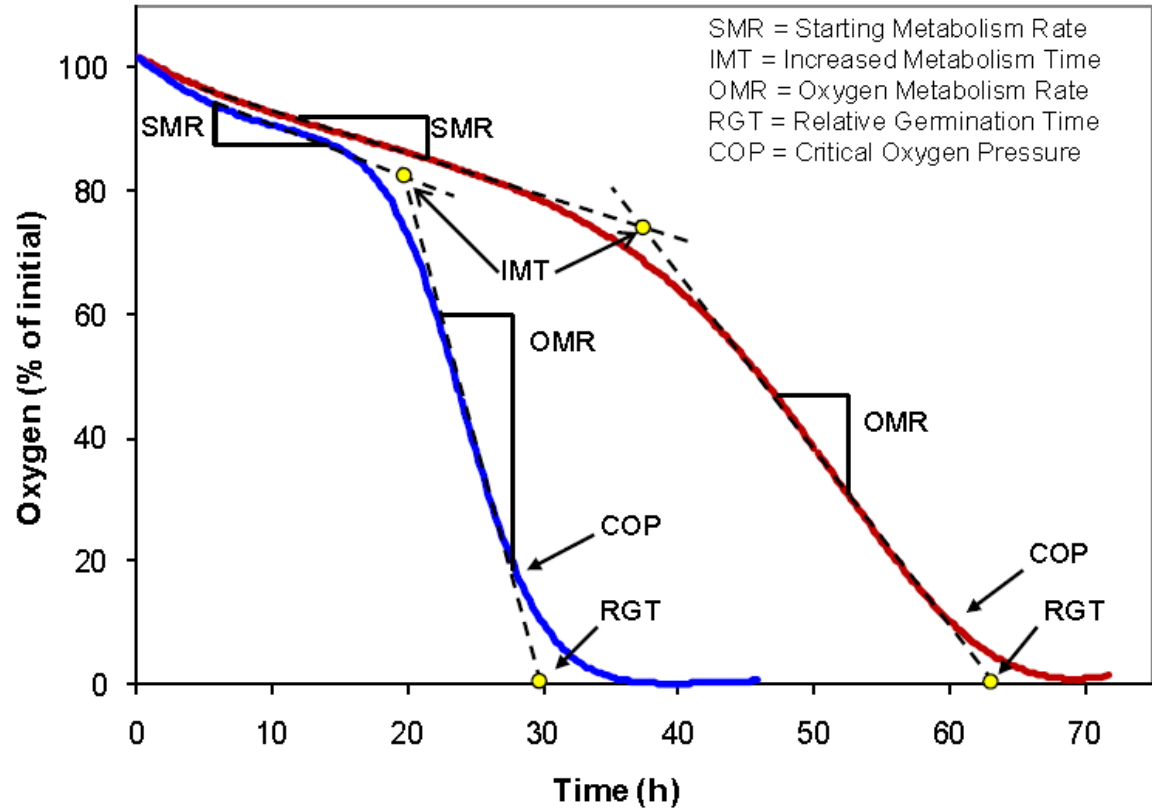


## cv. Cha Cha

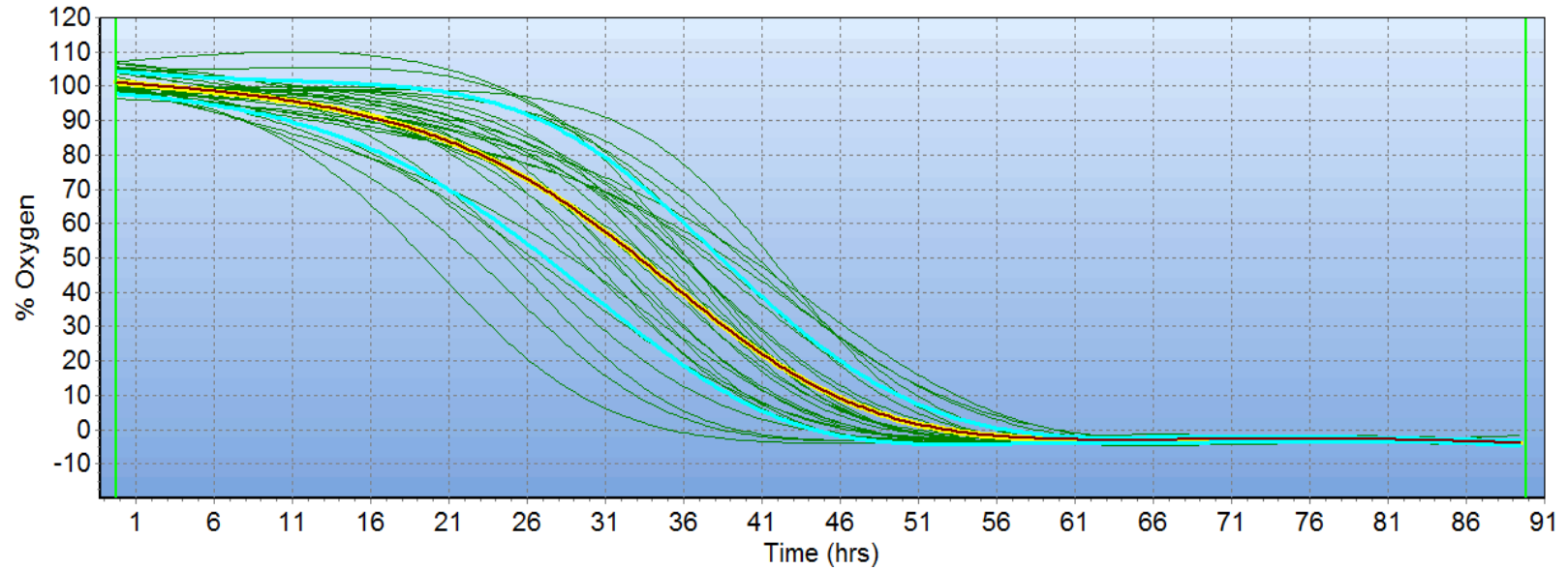


- ◆ > 2,8 mm
- 2,5 - 2,8 mm
- ▲ 2,2 - 2,5 mm
- × 15 min HT
- \* 30 min HT

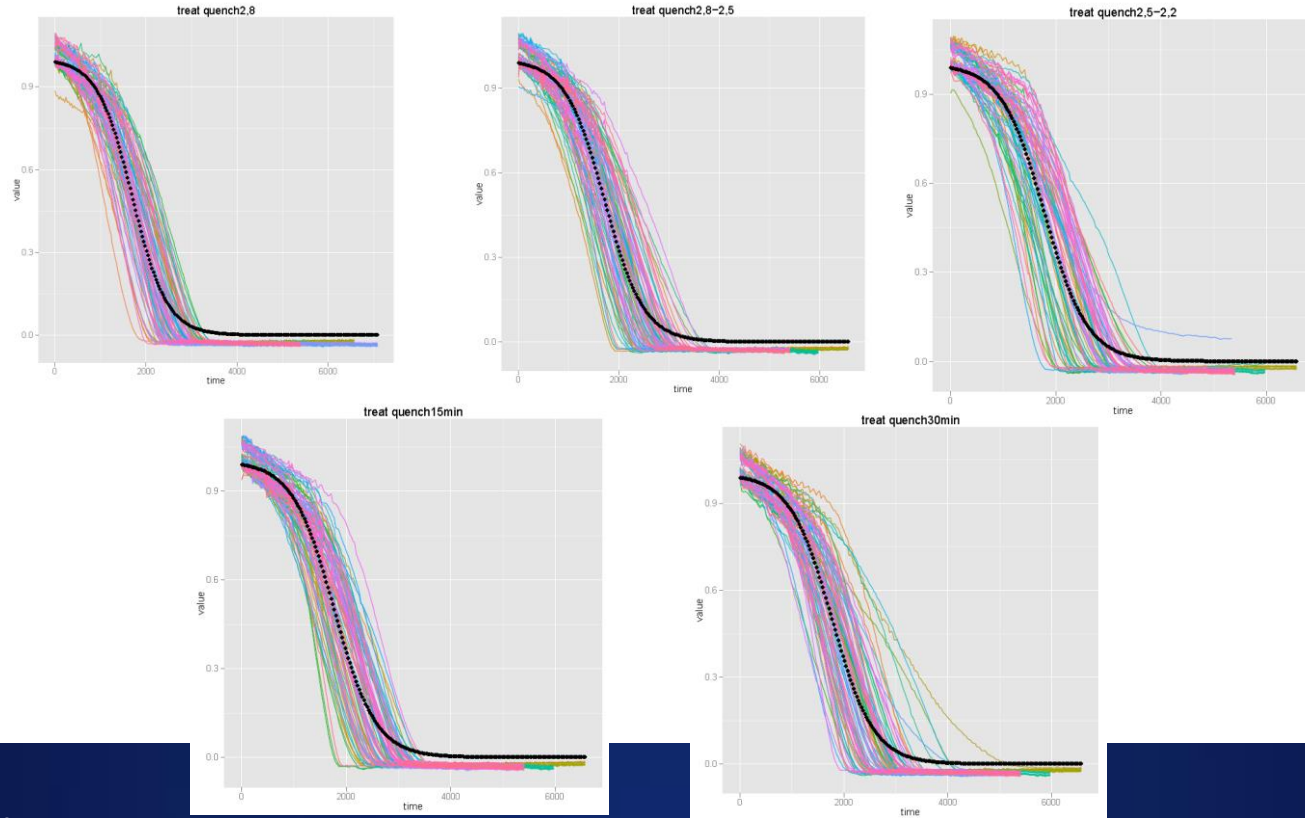
# Q2 RESULTS



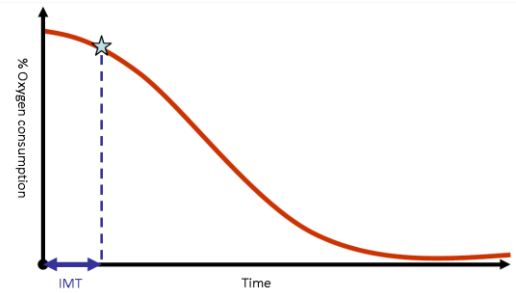
# Q2 RESULTS



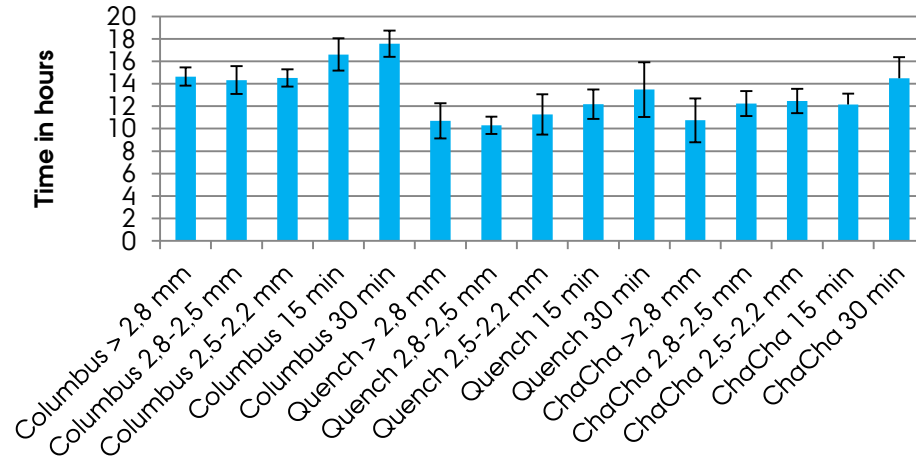
# Q2 RESULTS (QUENCH)



# Q2 RESULTS



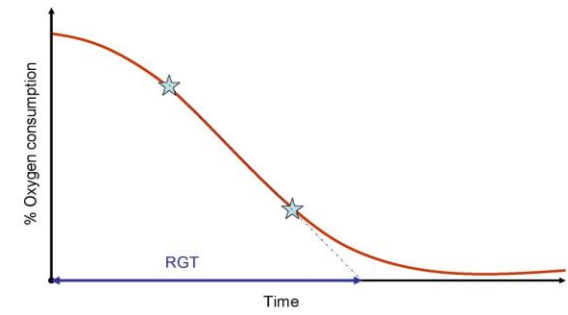
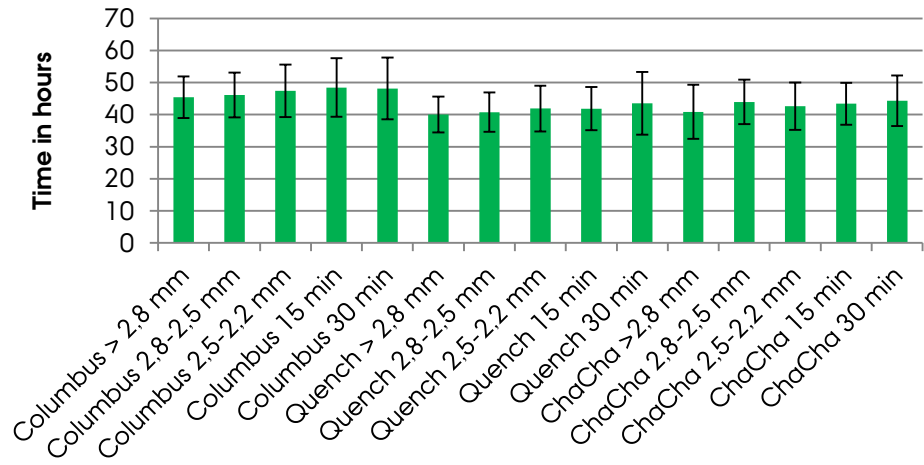
## Increased Metabolism Time (IMT)



# Q2 RESULTS



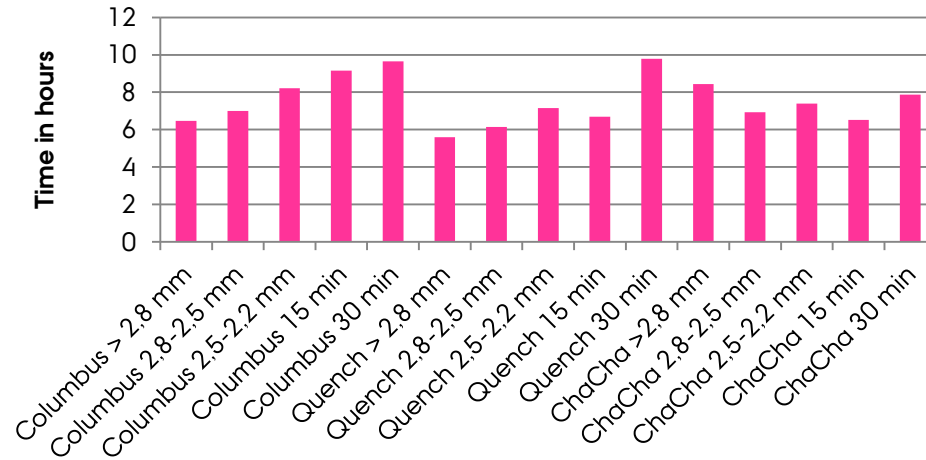
## Relative Germination Time (RGT)



# Q2 RESULTS

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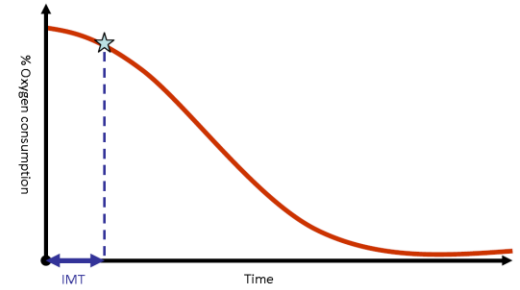
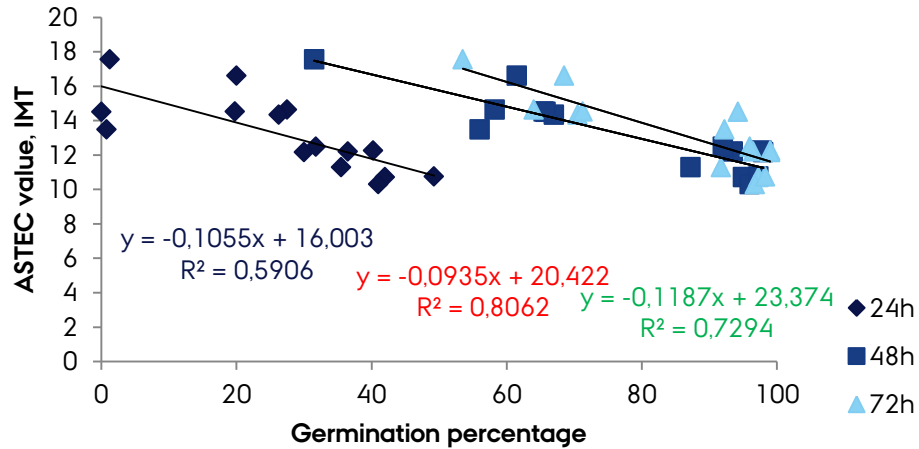
## Homogeneity (HOM)



# CORRELATION

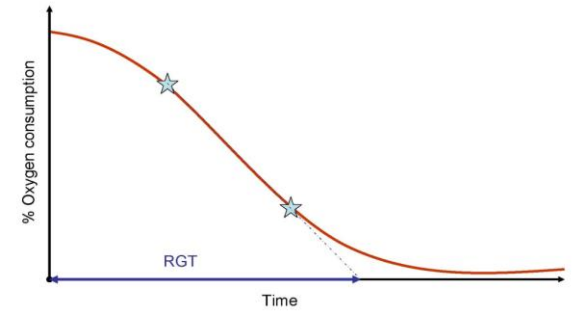
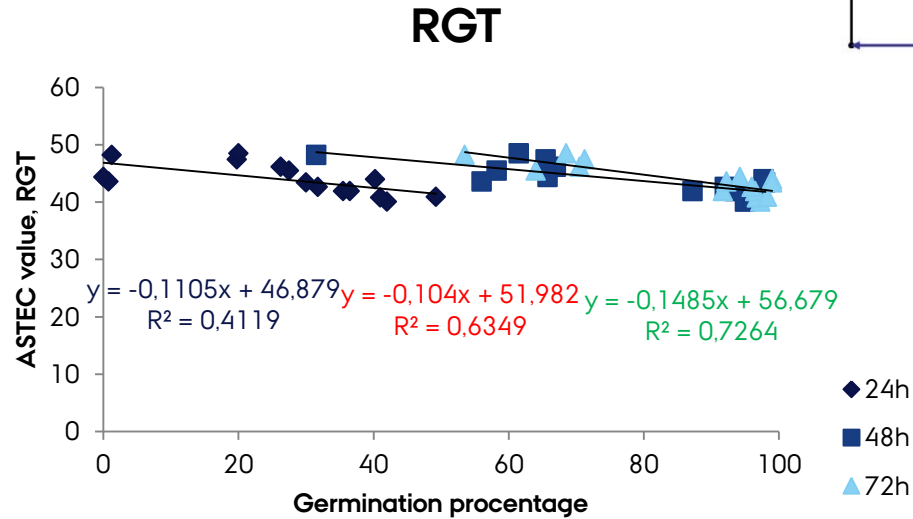


IMT





# CORRELATION



# PERSPECTIVES

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- ▶ Good perspectives – when the right protocol is made
- ▶ Big capacity
- ▶ Provide supplementary information of the seed lot quality
- ▶ Perspectives in the breeding industry
- ▶ Scientific work

# CONCLUSION

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- ▶ Not displacement for standard germination test – but a supply!
- ▶ The Q2 could identify and provide information the germination pattern
- ▶ Reproducible
- ▶ Further development of the protocol
- ▶ More tests are needed

# ACKNOWLEDGEMENT

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- ▶ Danish malting group



AARHUS  
UNIVERSITET