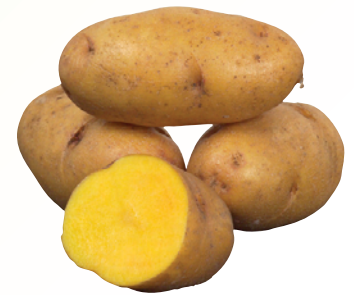


The effects of processing and storage on potato tuber umami content: implications for product flavour and reduced salt formation

Wayne Morris and Mark Taylor
SCRI, Invergowrie, Dundee, DD2 5DA, Scotland, UK

E-mail Wayne.Morris@scri.ac.uk
Tel: +44 (0)1382 562731
Fax: +44 (0)1382 562426



Background

- After cost the most important driver for consumer food purchase is flavour.
- In addition to the four more commonly recognised tastes, sweet, sour, salt and bitter, there is an emerging recognition of the fifth taste – *umami*.
- Umami compounds gives food a savoury, 'moreish' quality and generally enhances flavour and mouth feel.
- The most potent umami compounds present in potato tubers are glutamate, aspartate, GMP and AMP.
- The umami compounds interact to increase the taste sensation and this can be measured using an equivalent umami calculation (EUC).

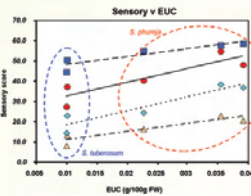


Figure 1. Tuberoseum cultivars Mars Piper (MP) and Record were compared with Phureja clones DB333-16 and DB257-28, and cultivar Mayan Gold (MG). Square, flavour intensity; circle, acceptability; diamond, flavour sweet; triangle, flavour creamy.

Previous studies at SCRI have shown that Phureja tubers contain significantly higher levels of umami compounds compared to Tuberoseum¹ correlating strongly with acceptability scores from sensory evaluation data.

Aims of the project

- Investigate the consequences of storage and processing methods on the levels of the tuber umami content.
- Exploit this knowledge to utilize the appropriate storage conditions for maintaining flavour.

Results

Effects of different storage regimes on tuber umami content

- Umami compounds were compared in Phureja and Tuberoseum tubers during storage at 4 and 10°C.
- EUC values are significantly higher in Phureja cultivars compared with Tuberoseum cultivars at harvest.
- However, after three months of storage at 4°C and 10°C, there was no significant difference in the EUC values for the Phureja and Tuberoseum tubers.

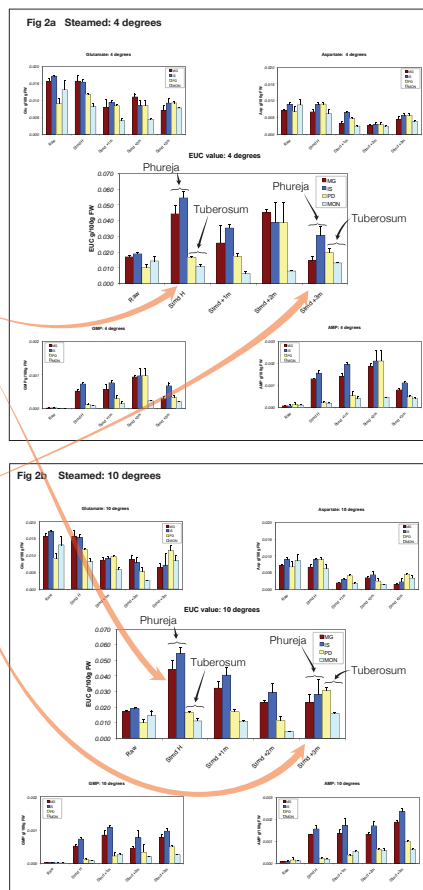


Figure 2a and 2b. Effect of tuber storage regime on umami amino acids, 5'-ribonucleotides and equivalent umami concentrations (EUC) in cooked potato cultivars Mayan Gold (MG), Inca Sun (IS), Pentland Dell (PD) and Montrose (MON). Tubers were sampled at harvest (H) and after 1, 2 and 3 months storage at 4°C and 10°C. Error bars represent the SEM (n=3).

Effects of different cooking treatments on tuber umami content

- Other processing methods including baking, microwaving and crisping were tested.
- In general, EUC values were 2-3 fold greater in Phureja tubers than in Tuberoseum tubers for both microwaved and baked tubers.
- EUC values increased after 2 months storage in baked and microwaved tubers.
- No clear-cut differences in EUC values were observed between Phureja and Tuberoseum in crisped samples.
- Much lower EUC values were found in crisps from tubers stored at 4°C than in those stored at 10°C.

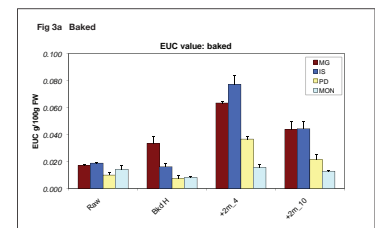


Figure 3a and 3b. Comparison of conventional and microwave baking and storage on equivalent umami concentrations (EUC) in potato cultivars Mayan Gold (MG), Inca Sun (IS), Pentland Dell (PD) and Montrose (MON). Tubers were sampled at harvest (H) and after 2 months storage at 4°C and 10°C. Error bars represent the SEM (n=3).

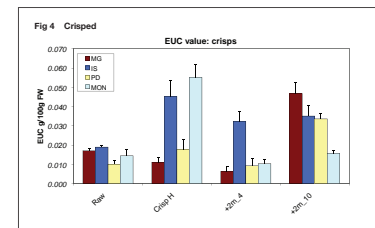
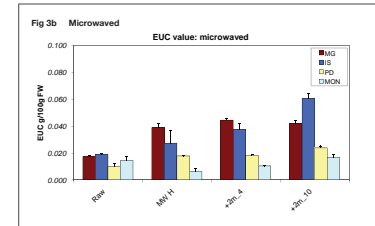


Figure 4. Effect of frying (crisps) and storage on equivalent umami concentrations (EUC) in potato cultivars Mayan Gold (MG), Inca Sun (IS), Pentland Dell (PD) and Montrose (MON). Tubers were sampled at harvest (H) and after 2 months storage at 4°C and 10°C. Error bars represent the SEM (n=3).

Achievements

- We have characterised, in detail, how the umami content of cooked tubers changes when subjected to different storage regimes and cooking treatments.
- In particular, we have shown that after 3 months storage the EUC values are no longer significantly higher in Phureja cultivars.

Potential outcomes

- Producing better flavoured potatoes may decrease the amount of additives needed to achieve the desired product quality.
- As umami is known to highlight saltiness in salty food, it may be possible to reduce the levels of added salt to processed potato products by using cultivars with a high natural umami content.

References

1) Morris W.L., Ross H.A., Duenck L.J.M., Bradshaw J.E., Bryan G.B., and Taylor M.A. 2007. Umami compounds are a determinant of the flavor of potato (*Solanum tuberosum* L.). *Journal of Agricultural and Food Chemistry* 55, 9627-9633.

Acknowledgements

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