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Author: C. Blanchard, A. Saliba, M. Gabard and P. Williams
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Abstract: Rice quality is known to influence market value, hence quality evaluation is essential for rice companies. Quality assessment of cooked rice can be determined by expert sensory panel analysis, but this process is costly. Some studies have attempted to use instrumental methods as an alternative to sensory analysis (Suwannapron et al., 2007), however, further studies are required to validate these methods. In this study, a comparison between instrumental methods and sensory evaluation was undertaken to assess the relative merits of these techniques for the comparison of similar rice cultivars and samples that have been stored at different temperatures.
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A COMPARISON OF INSTRUMENTAL AND SENSORY EVALUATION OF RICE

M. Gabard[1, 2], C. Blanchard[2, 3], P. Williams[4] and A. Saliba[2]

[1]Institute for Sciences & Engineering Techniques (ISTIA), University of Angers, 49100, FRANCE

[2]School of Wine & Food Sciences, Charles Sturt University, Wagga Wagga, 2678, AUSTRALIA

[3]EH Graham Centre for Agricultural Innovation, WAI, Wagga Wagga, NSW 2650, AUSTRALIA

[4]Sunrice, Leeton, NSW 2705, AUSTRALIA

INTRODUCTION

Rice quality is known to influence market value, hence quality evaluation is essential for rice companies. Quality assessment of cooked rice can be determined by expert sensory panel analysis, but this process is costly. Some studies have attempted to use instrumental methods as an alternative to sensory analysis (Suwannapron *et al.*, 2007), however, further studies are required to validate these methods. In this study, a comparison between instrumental methods and sensory evaluation was undertaken to assess the relative merits of these techniques for the comparison of similar rice cultivars and samples that have been stored at different temperatures.

METHODS AND MATERIALS

Storage trial

Two rice cultivars, Doongara and Koshihikari, were evaluated in this experiment. Rice samples were stored for 4 weeks at two different temperatures: 4°C and 37°C. Sensory analysis was undertaken using a consumer panel and instrumental assessment was conducted using an RVA.

Eighteen grams of the samples were soaked for one hour before being cooked in tea baskets submerged in boiling water for 13 minutes. The sensory panel assessed the rice for the following factors: opaqueness, smoothness, glossiness, firmness, stickiness, chewyness and creaminess.

Aliquots of the rice samples were also ground and the resulting flour was analysed using an RVA to determine the pasting properties. Each RVA canister contained 3g of flour and was made up to 28g using de-ionised water. A standard rice RVA program was used.

Comparison trial

Six rice varieties were analysed in this experiment. Three were long grain cultivars and 3 were "jasmine-like" cultivars. Instrumental analysis was conducted as outlined above. Sensory evaluation was undertaken in the same way as the stored samples, however, some additional parameters were also assessed including whiteness, fluffiness, aroma strength, flavour strength and preference ranking.

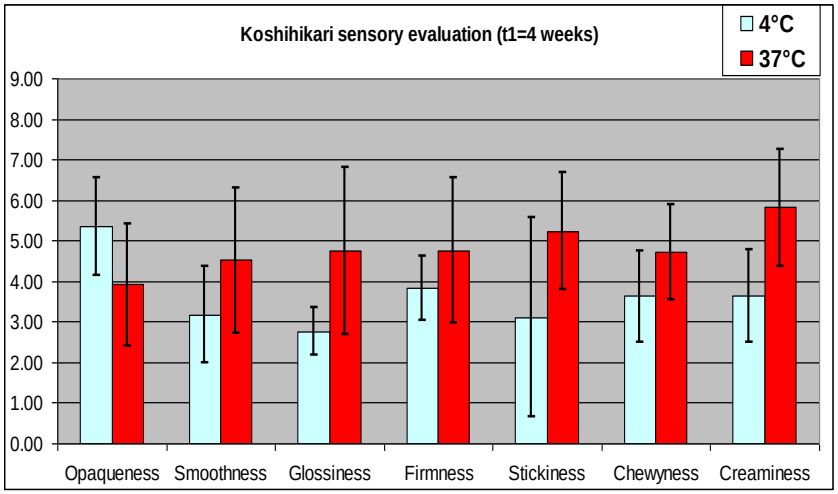
Statistical analysis

Data was analysed using Analysis of variance (ANOVA) and Principle Component Analysis (PCS). Degrees of significance were reported at the 5% level.

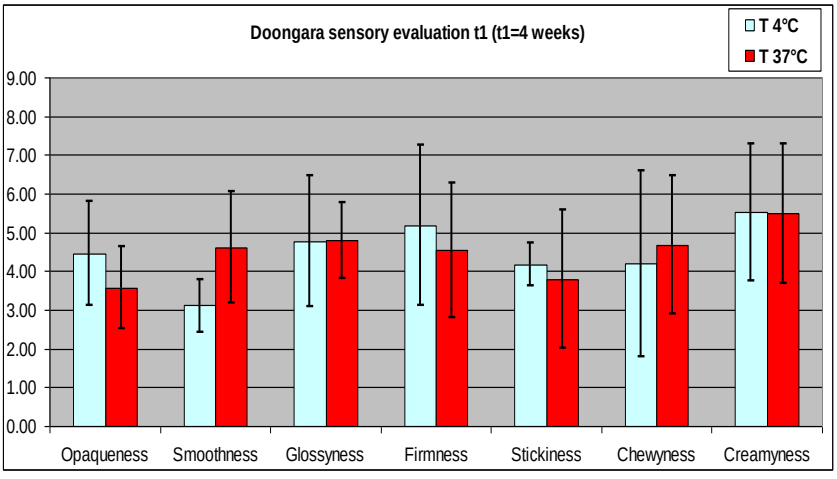
RESULTS AND DISCUSSIONS

Storage trial

After 4 weeks of storage, differences in sensory parameters were apparent. These differences appeared to be greater in the Koshihikari samples. However, due to an inadequate number of panellists for this experiment (n=6) the differences were not statistically significant (Figure 1a and 1b).



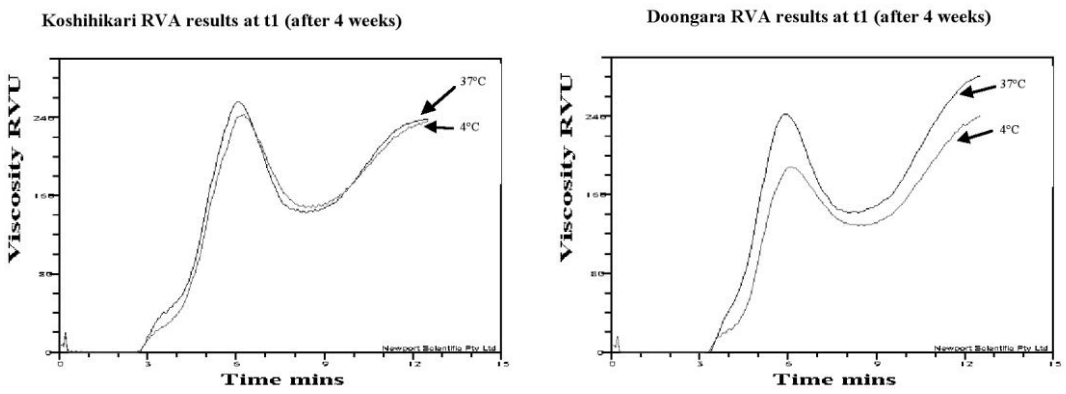
a



b

Figure 1: Effect of storage temperature on sensory properties of Koshihikari (a) and Doongara (b). The units on the Y axis of each graph refers to a rating scale of 1-10.

RVA analysis was able to demonstrate that storage temperature affected pasting properties after only 4 weeks of storage. Figure 2 shows typical RVA curves of rice samples stored for 4 weeks. Differences in peak viscosity, trough and final viscosity were generally greater for Doongara than for Koshihikari.

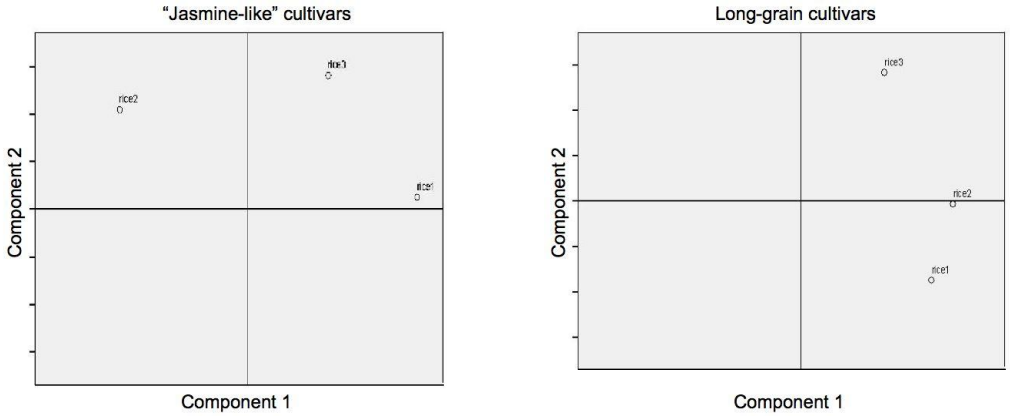


a **b**

Figure 2: Typical RVA curves of Koshihikari (a) and Doongara (b) samples after 4 weeks of storage.

Comparison trial

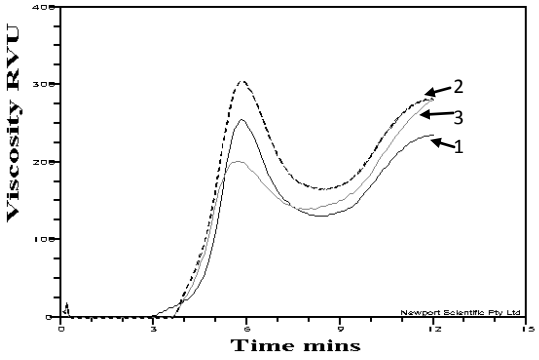
Principal component analysis of sensory panel results showed a quantitative difference between the three cultivars assessed in each group (Figure 3). These differences are likely to reflect differences observed by consumers.

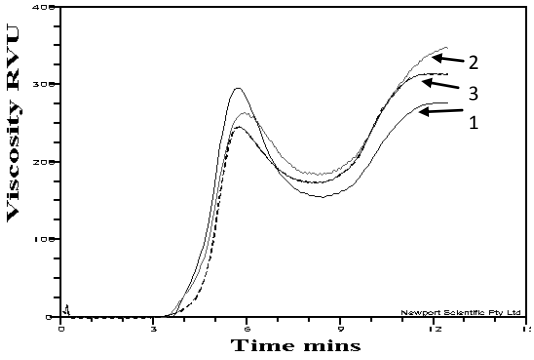


a **b**

Figure 3: PCA charts of "Jasmine-like" (a) and Long grain rice cultivars (b)

RVA analysis also showed differences between the rice cultivars (Figure 4). While this is a more convenient method for analysing samples, it is difficult to correlate changes in the RVA curve with changes in sensory parameters


Viscosity RVU
Time mins
Newport Scientific Pty Ltd
2
3
1


Viscosity RVU
Time mins
Newport Scientific Pty Ltd
2
3
1

a **b**

Figure 4: RVA results for the long grain rice (a) and “Jasmine-like” rice cultivars (b)

CONCLUSION

These preliminary data have shown that both RVA and sensory analysis have their relative merits in the analysis of rice quality. When assessing the effect of storage on rice quality, one sample showed that sensory evaluation was more effective whereas in the other sample, a greater difference was apparent in RVA analysis. Further work is required, however, to improve the statistical validity of these results. Nevertheless, it is clear that both sensory evaluation and instrumental analyses are valuable in assessing quality and both techniques should be used to assess quality attributes.

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Zhou, Z., Robards, K., Helliwell, S. and Blanchard, C. (2002) Ageing of stored rice: changes in chemical and physical attributes. *Journal of Cereal Science* **35,** 75-78.