Viscosity of Enzymatically-Extracted Potato Fibres in Fruit Juices

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ABSTRACT

The aim of this work to assess the potential for developing functional beverages with added dietary fibres from potatoes. The rheological and visual quality effects of adding enzymatically solubilised potato fibres to six different fruit juices was studied. This poster shows comparison measurements of the shear viscosity at 4^{o}C of a commercially available vegetable juice with enzymatically-extracted potato fibres added in different weight concentrations.

INTRODUCTION

Dietary fibre plays an important role in maintaining human health. Gums, pectins, some hemicelluloses and mucilages are classified as soluble dietary fibre and have higher impact on health benefits than insoluble fibres, which undergo little change as they pass through the body, and primarily act as bulk (cellulose, many hemicelluloses, lignin)[1]. The present work looks at using at the effect on viscosity of adding a new enzymatically-extracted potato fibre product to juices.

MATERIALS AND METHODS

Potato fibres were solubilised from potato pulp resulting from potato starch manufacture (AKM Brande, Denmark) via an enzyme-assisted process[2]. The effects on juice viscosity of addition of 0.25% - 3% by weight of dry potato fibres to different commercial juices: orange, prune, vegetable (tomato-celery), and three types of apple juices were assessed by Stress Tech analysis (Version 3.8, Reologica Instruments AB, Sweden).

The consistency index K (Pas^{n}) and the flow index n were estimated using the Oswald De Waele power law equation (ReoLogica Instruments AB, Sweden, Analyse Software, 3.60). The turbidity of the juices was assessed by nephelometry. All measurements were done over 48 hours at 4°C ±0.3°C during cold storage of the juices. This article discusses the effect of fibres on the vegetable juice.

RESULTS AND DISCUSSION

Without added potato fibre the juices with pulp, i.e. orange juice and the vegetable juice, were sensitive to shear: they were shear-thinning products, $n < 1$, with the vegetable juice exhibiting the most shear-thinning behaviour with n around 0.5. The juices without pulp showed Newtonian behaviour and were not sensitive to shear, n=1.

Effect of Addition of Potato Fibres

In the vegetable juice, the consistency index was high even without potato fibre added (K=50 mPa.s^{n}). The addition of potato fibres had a unique reducing effect on the K-value, which was opposite to the effect seen in the other juices and in water. The highest viscosity effects of the fibre addition was found in the vegetable juice that had viscosity slopes of 3.5-4 in response to fibre level addition, while the other samples' viscosity slope responses ranged from 1-2. Turbidity of the juices generally increased linearly in response to added fibre content up to 1% of fibre, after which the turbidity increased according to an exponential response function. Figure 1 shows the response of vegetable juice to addition of different amounts of enzymatically solubilised potato fibres.

CONCLUSIONS

The solubilised potato fibres performed well in the vegetable (tomato-celery) juice with a small . tomato-celery juice may be a good vehicle for dietary fibre supplementation with these potato fibres.

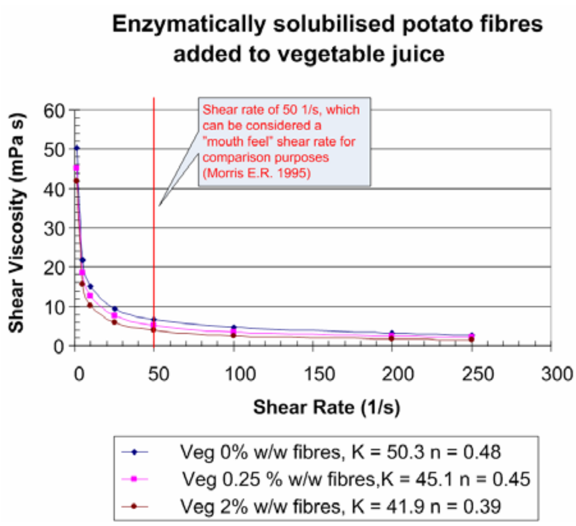

Figure 1. Viscosity of vegetable juice with addition of different amounts of enzymatically-solubilised potato fibres. 50 1/s is considered a "mouth-feel" shear rate for comparison purposes[3].

Table 1. K and n values for solubilised potato fibres in vegetable juice

Product	K ($mPa.s^n$)	n
Shear-thickening product		n>1.0
Newtonian product		n=1.0
Shear-thinning product		n <1.0
0 g fibre/100g product	50.3	0.48
0.25 g fibre/100g product	45.1	0.45
2.00 g fibre/100g product	41.9	0.39

REFERENCES

1. Jenkins DJA, Kendall CWC, Ransom TPP. 1998. Dietary fiber, the evolution of the human diet and coronary heart disease. Nutrition Research 18(4):633-52.

2. Olesen M., Gudmand-Høyer E., Norsker M., Kofod L., Adler-Nissen J. 1998: Fermentability of an enzymatically modified solubilised potato polysaccharide (SPP), Eur. J. Clin. Nutr. 52, 110-114

3. Morris E.R. 1995. Polysaccharide Rheology and In-Mouth Perception. In: Stephen A.M., editor. Food Polysaccharides and their Applications. New York, Basel, Hong Kong: Marcel Dekker, Inc; p 517-46.