

Studies on dietary fibre content of four uncommon palmyrah fruit types.

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Abstract

The fruit pulp of common types of palmyrah (*Borassus flabellifer*) contains high quantities of dietary fibre and pectin content which had been reported to be 5-7%. Four uncommon fruit types were collected from Mannar, Sri Lanka. The fruit pulp contained 12.8 to 16.8% insoluble dietary fibre and 9.7 to 10.9% dry weight soluble dietary fibre. Pectin contents were high (8.1 to 10.6% dry weight) and pectin was by far the largest contributor soluble dietary fibre. Sepharose-gel chromatography showed that the soluble dietary fibre was polydisperse with some fractions in type A and type B showing eluent volume corresponding to molecular weight in excess of 2 million Daltons. The study show that: (i) if these uncommon type are propagated this could yield a commercially valuable by-product in pectin. (ii) high fibre content of fruit pulp can result in medically beneficial effects when edible palmyrah fruit preparations is consumed.

Key words : Dietary fibre, fruit pulp, palmyrah, pectin,s epharose gel-chromatography

1. Introduction

Apart from an unpublished study by Pathberiya *et al.* (2004) which showed that dietary fibre in the four common types of palmyrah fruit pulp (PFP) was 12 to 24% dry weight, there has been no other study on this topic. However pectin content of PFP has been reported previously to be 5-7%. (Balasubramanium *et al.*, 1999). While dietary fibre content is significant in that it reduces serum cholesterol, glycaemic index and large bowel diseases (Widramanayke, 1996), pectin content is important as when present in large quantities it can be isolated and used as an additive in the food industry (Balasubramanium *et al.*, 1999). The size distribution of pectin is important as increasing viscosity (size) can bring about a more efficient binding of bile salts in the gastro-intestinal tract (Mietten and Tarpia, 1977) and can be more effective in serum cholesterol reduction on consumption.

The objective of this study was :

(i). The search for uncommon palmyrah fruit types having high dietary fibre and pectin content in order that they may be propagated, ideally by tissue culture, to give better sources of PFP derived edible products and higher yields of isolated pectin. The latter is valuable in the Food industry as a additive.

2. Materials and Methods**Collection & stored palmyrah fruits**

Uncommon palmyrah fruit were collected on a field trip to Mannar in August 2004 and brought back to Nugegoda (300 km away) and stored at -20°C. The fruits were kept intact until analysis.

Classification of fruits

The fruits were classified into 4 types. A, B, C, D

Type A Small fruit dark brown

Type B Large fruit Brown with yellow patch at bottom

Type C Small fruit Black with orange patches on side

Type D Large fruit Off white with faint black longitudinal stripes.

Extraction of palmyrach fruit pulp

Just prior to experimentation the fruits were opened with a knife. the fruit pulp extracted with water (1:2) and moisture content determined by the Dean and Stark method (AOAC, 1984).

Dietary fibre determination

This was carried out by the procedure of Asp *et al.* (1983) and soluble dietary fibre (SDF) and insoluble (IDF) dietary fibre was determined.

Soluble dietary fibre isolation

The procedure of Asp *et al.* (1983) was followed upto the stage of precipitation of SDF. The SDF was filtered through Whatman No. 4 filter paper and freeze dried.

Pectin content

Pectin content of determined by the carbazole reaction (Dekker and Rechards, 1972) using SDF prepared as above. A standard curve for pectin ($r^2 = 0.9916$) was used.

Sepharose gel-chromatography

A CL-2B - 300 sepharose column 20cm long and 1cm. i.d. was prepared in using 0.1 M phosphate buffer (pH = 6.8) SDF (50mg) was dissolved in the same buffer and introduced to the column which was then eluted with buffer. Fractions (2ml) were collected, freeze dried and SDF content determined gravimetrically. The apparent void volume of column was calculated with blue dextran (MW= 2 million) was 8 ml. This appears not the true void volume as some fractions of SDF run slightly faster.

3. Results

Soluble and insoluble dietary fibre contents

Content of total dietary fibre 20-24% dry weight (table 1) was comparable to common plamyrah fruit pulps. Type C had highest - IDF (16.77). SDF of all 4 types were similar but higher than usual (table 1)

Pectin content

Pectin content ranged for 8.1-10.8% DW (table 2), this was much higher than previously reported (Balasubramanium et al., 1999). The bulk of the SDF was pectin (92-99%) except for type C with had 84% pectin in SDF.

Sepharose gel chromatography

The elution profiles are shown in fig 1 A, B, C, and D. These are virtually the pectin molecular weight profiles for types A, B, and D. Fig 1 shows the profiles, from a constant weight of 50 mg SDF added to the column in each case. The profiles are polydisperse as expected with some types showing very low elution volume fractions (type A and B).

Table 1 Soluble, Insoluble and total dietary fibre content of PFP

Type	SDF (%DW)	IDF (%DW)	Total fibre (%DW)
A	10.89	12.76	23.65
B	10.32	10.20	20.52
C	9.67	16.77	26.44
D	10.72	14.93	25.75

All measurements were made in duplicate.

Table 2 Pectin content of SDF

Type	Pectin (DW)	Pectin (%SDF)
A	10.8	99.2
B	9.5	92.1
C	8.1	83.8
D	10.6	98.9

All measurements were made in duplicate.

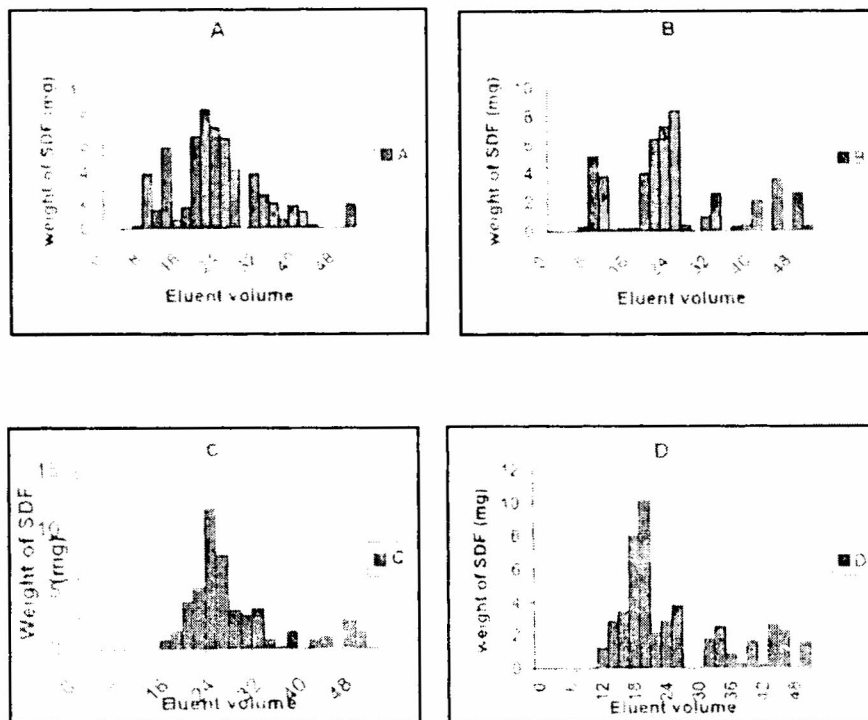


Fig : 1 Eluent volumes of SDF on sepharose gel chromatography. A, B, C & D correspond to fruit types.(see experimental)

4. Discussion

The dietary fibre (both SDF and IDF) is high and this gives the PEP's an interesting potential use as hypocholesterolaemic agent, glycaemic index lowerers and retarders of large bowel disease of individuals consuming PFP in its varied edible forms. Pectin content is high and isolatable. Pectin which is a by-product of PFP (after isolation of surgar and flabelliferins) is a well known food additive in jams, cordials, etc. in the food industry. As these palmyrah fruit types were very uncommon therefore commercial exploitation is not feasible at the present time. However, since the Palmyrah Development Board, Sri Lanka has as a long term objective, the propagation of special palmyrah types for varied end uses (private communication), at least one of these types could find a place in propagation particularly by tissue culture. It appears that focus on pectin extraction could be the best long-term objective.

5. Acknowledgments

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