

# PULSE FIBRES

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## Functional Advantages of Pulse Fibres<sup>1,2,3,4,5</sup>

- Neutral taste
- Colourless
- Gluten-free
- Non-GM
- High water binding capacity
- High fat binding capacity
- Good texturing effect

## Nutritional Benefits of Pulse Fibres<sup>6,7,8</sup>

- Enrich fibre content of food without affecting sensory properties
- Can be used to formulate special diet foods – low glycemic index, low calorie, fat mimetic
- May be protective against heart disease, diabetes, obesity and colon cancer
- Promotes regularity
- No cholesterol
- Pea hull fibres are recognized as a dietary fibre by Health Canada

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Pulse Canada

1212-220 Portage Avenue, Winnipeg, Manitoba, Canada R3C 0A5 T: 204 925 4455, F: 204 925 4454, E: [office@pulsecanada.com](mailto:office@pulsecanada.com)

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Biochemical Composition of Select Canadian Pulses<sup>9</sup> (g/100g dry matter)

| Pulse      | Protein (N x 6.25) | Starch    | Amylose (% starch) | ADF      | NDF      | Fat     | Ash     |
|------------|--------------------|-----------|--------------------|----------|----------|---------|---------|
| Field Pea  | 20.2–27.4          | 41.6–49.0 | 20.7–33.7          | 5.8–8.7  | 8.4–11.2 | 1.0–1.7 | 2.3–3.4 |
| Chick pea* | 17.9–30.8          | 33.1–43.9 | 20.5–29.2          | 3.0–13.5 | 4.2–13.6 | 4.4–6.9 | 2.7–3.8 |
| Beans**    | 19.7–34.3          | 31.8–45.3 | 19.9–29.6          | 5.5–9.3  | 7.3–12.8 | 0.7–2.3 | 3.2–4.7 |
| Lentil***  | 21.3–30.2          | 41.5–48.5 | 22.5–28.3          | 4.5–7.4  | 7.0–9.5  | 1.0–1.3 | 2.3–3.5 |

\*Includes Desi and Kabuli types. \*\*Includes red, light red and white kidney beans, navy, black turtle, cranberry, dutch brown, great northern, pinto, small red and pink beans. \*\*\*Includes green and red lentils.

## Pulse Fibres

The non-starch polysaccharides in pulses are comprised of mono- and disaccharides, low molecular weight oligosaccharides and a non-digestible fraction or fibre fraction that is composed of cell wall polysaccharides combined with galactose, arabinose, fucose and xylose<sup>10,11</sup>

Pulse fibre fractions contain unique polysaccharides – the hemicellulose-arabinoxylan and the pectin-xylogalacturonan – with potential prebiotic effects<sup>12,13</sup>

Sugar composition of pulse fibres<sup>14,15</sup>

|           |          | Arabinose | Xylose | Galactose | Glucose | Uronic Acids |
|-----------|----------|-----------|--------|-----------|---------|--------------|
| Hull      | Pea      | 24.6      | 26.0   | 15.5      | 70.7    | 1.6          |
|           | Lentil   | –         | 25.2   | –         | 72.3    | 2.5          |
|           | Chickpea | 25.3      | –      | –         | 73.4    | 0.9          |
| Insoluble | Pea      | 46.3      | 20.8   | –         | 31.3    | 1.7          |
|           | Lentil   | 45.7      | 19.8   | –         | 31.7    | 2.8          |
|           | Chickpea | 51.4      | 20.9   | –         | 27.4    | 0.2          |
| Soluble   | Bean     | 19.7      | 9.0    | 3.0       | 53.3    | 12.9         |
|           | Pea      | –         | –      | 19.2      | 69.4    | 1.3          |
|           | Lentil   | –         | –      | 21.1      | 65.5    | 1.0          |
|           | Chickpea | –         | 32.0   | 16.4      | 41.1    | 0.2          |
|           | Bean     | 42.4      | 7.1    | 7.7       | 14.2    | 23.9         |

Composition of Fibre in Raw Pulses (% of dry matter)<sup>16</sup>

|                    | Cellulose | Hemi-cellulose | Pectins |
|--------------------|-----------|----------------|---------|
| Peas               | 18.2      | 5.9            | 28.3    |
| Red kidney beans   | 6.2       | 20.2           | 7.4     |
| White kidney beans | 8.0       | 14.9           | 9.3     |
| Chickpeas          | 8.5       | 16.0           | 9.5     |
| Lentils            | 8.1       | 20.3           | 9.5     |

## Applications

| Nutritional Applications  | Food Applications  | Non-Food Applications  |
|---|--|--|
| <ul style="list-style-type: none"> <li>• Calorie reduction</li> <li>• Cholesterol reduction</li> <li>• Glycemic response</li> <li>• Laxation</li> </ul> | <ul style="list-style-type: none"> <li>• Processed meat products, sausages and pepperoni for its good fat binding properties</li> <li>• Fibre fortification of baked goods and pastas.</li> <li>• Used as fat mimetic</li> </ul> | <ul style="list-style-type: none"> <li>• Paper</li> <li>• Substrate for purification of alpha-galactosidase</li> <li>• Filler for biodegradable plastic</li> </ul> |

## Canadian Research Expertise

- D. Jenkins, Dept. Nutritional Sciences, University of Toronto, Toronto, ON
- Nutritional management of diabetes and hyperlipoproteinaemia; metabolic and intestinal effects of starch and fibre
- S. Tosh, Food Research Program, Agriculture and Agri-Food Canada, Guelph, ON
- Functionality and health benefits of dietary fibres and cereal polysaccharides
- V. Vuksan, Dept. Nutritional Sciences, University of Toronto, Toronto, ON
- Physiological effects of dietary carbohydrate and fibre; risk factor modification of chronic diseases

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