



# Product Profile

Cigi (Canadian International Grains Institute) | cigi.ca



**Gluten-Free Crackers Formulated with Pulse Ingredients**

## Pulse Ingredients in Gluten-Free Crackers

As the gluten-free market continues to grow, consumers are searching for gluten-free products that are both great tasting and nutritious. Pulse flours are high in protein, dietary fibre, vitamins and minerals. Incorporating them into a gluten-free cracker formulation creates an opportunity to enhance the nutritional profile. This information sheet will demonstrate how the addition of pulse ingredients affects the quality of gluten-free crackers and illustrate the advantage of using pulse ingredients in gluten-free food applications.

### Gluten-Free Cracker Formulation and Lab Scale Processing

The nutritional profile and flavour characteristics of pulse flours were considered when the formulation was developed for the gluten-free pulse crackers. To evaluate the effect of incorporating different blends of pulse flours into gluten-free crackers, three different blends of pulse flours were utilized for each formulation: (50% whole yellow pea/50% split red lentil, 50% whole yellow pea/50% pre-cooked navy bean and 50% split red lentil/50% pre-cooked navy bean). Each pulse flour blend was incorporated at 32.6% of the flour mixture and pea fibre was incorporated at 7.0% of the flour mixture, according to the formulation listed in Table 1.

Flour and starch ingredients were whisked together with salt, xanthan gum and egg powders in a KitchenAid stand mixer bowl. Vegetable shortening was added, then mixed together using the paddle attachment for 1 minute. In a separate bowl, water and ammonium bicarbonate were combined, then vinegar was added. Liquid mixture was added to KitchenAid mixer bowl, then mixed for 2 minutes, scraping the bowl after 1 minute. Dough was covered and allowed to rest for 20 minutes, then rolled out between 2 sheets of parchment paper. Once dough was rolled to 4-5 mm thickness, it was folded in half and rolled out again. This process was repeated 4 times until final thickness of dough sheet was 2-3 mm. Using a dough docker, dough sheet was docked and cut into 4x4 cm squares. Dough squares were placed on a baking sheet lined with parchment paper and baked for 8 min at 204°C, then left in the oven for an additional 2 minutes with the oven off. Crackers were allowed to cool for 90 minutes before packaging.

**Table 1. Formulations for Gluten-Free Crackers Containing Pulse Flours**

	Formulation Amount (Bakers %)	
	Control	Pulse Blend
Flour and starch	100	100
• White rice flour	• 31.8	• 20.0
• Brown rice flour	• 31.8	• 20.0
• Corn starch	• 13.6	• 12.5
• Potato starch	• 9.1	• 8.0
• Corn four	• 13.6	• 0
• Pulse flour blend	• 0	• 32.6
• Pea fibre	• 0	• 7.0
Salt	1.6	1.6
Xanthan gum	1.5	1.5
Ammonium bicarbonate	1.4	1.4
Whole egg powder	2.7	2.7
Egg white powder	1.8	1.8
Vegetable shortening	12.3	12.3
Water (30°C)	43.6	51.8
Apple Cider Vinegar	2.7	2.7

## Results and Recommendations

The addition of pulse flours and pea fibre resulted in crackers that were more firm and generally thicker compared to the gluten-free control cracker. On day 7, cracker firmness decreased for all pulse samples and flexibility and moisture content decreased except in the yellow pea/split red lentil cracker. Among the three different pulse blends, the crackers containing yellow pea/pre-cooked navy bean best maintained its texture through days 1 to 7 and also produced the thinnest cracker. Crackers made with the yellow pea/red lentil flour produced a cracker with the most desirable flavour, as indicated by preliminary test trials (results not shown). All pulse crackers produced a cracker with an increased nutritional profile, particularly fibre content which could be claimed as a source of fibre (Figure 1). Cigi's technology staff are continuing to optimize gluten-free cracker formulations to meet the needs of gluten-free companies, retailers and consumers.

**Table 2. Gluten-Free Cracker Quality when Formulated with Selected Pulse Ingredients**

Cracker Type	Force Required to Break (Firmness) (g)		Distance to Peak Force (Flexibility) (mm)		Moisture (%)		Thickness (mm)
	Day 1	Day 7	Day 1	Day 7	Day 1	Day 7	
Control	754.5	622.2	4.9	4.8	4.8	5.1	3.2
50% Whole Yellow Pea/50% Split Red Lentil	1997.9	1200.5	5.0	6.8	9.8	10.7	3.5
50% Whole Yellow Pea/50% Pre-Cooked Navy Bean	1073.0	1033.9	6.5	6.0	7.7	7.4	2.9
50% Pre-Cooked Navy Bean/50% Split Red Lentil	1796.2	1166.4	6.9	5.8	8.2	6.8	3.4

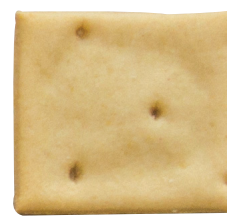
**Figure 1: Nutrition Facts for Gluten-Free Crackers Formulated with Pulse Ingredients (L to R: Control, 50% Whole Yellow Pea/50% Split Red Lentil)**

Nutrition Facts	
Valeur nutritive	
Serving Size (15 g) / Portion (15 g)	
Amount	% Daily Value
Teneur	% valeur quotidienne
<b>Calories / Calories</b> 60	
<b>Fat / Lipides</b> 1.5 g	2 %
Saturated / saturés 0.5 g	3 %
+ Trans / trans 0 g	
<b>Cholesterol / Cholestérol</b> 5 mg	
<b>Sodium / Sodium</b> 115 mg	5 %
<b>Potassium / Potassium</b> 5 mg	1 %
<b>Carbohydrate / Glucides</b> 9 g	3 %
Fibre / Fibres 0 g	0 %
Sugars / Sucres 0 g	
<b>Protein / Protéines</b> 1 g	
Vitamin A / Vitamine A	0 %
Vitamin C / Vitamine C	0 %
Calcium / Calcium	0 %
Iron / Fer	2 %

Nutrition Facts	
Valeur nutritive	
Serving Size (15 g) / Portion (15 g)	
Amount	% Daily Value
Teneur	% valeur quotidienne
<b>Calories / Calories</b> 50	
<b>Fat / Lipides</b> 1.5 g	2 %
Saturated / saturés 0.5 g	3 %
+ Trans / trans 0 g	
<b>Cholesterol / Cholestérol</b> 5 mg	
<b>Sodium / Sodium</b> 120 mg	5 %
<b>Potassium / Potassium</b> 45 mg	1 %
<b>Carbohydrate / Glucides</b> 8 g	3 %
Fibre / Fibres 2 g	8 %
Sugars / Sucres 0 g	
<b>Protein / Protéines</b> 2 g	
Vitamin A / Vitamine A	0 %
Vitamin C / Vitamine C	0 %
Calcium / Calcium	0 %
Iron / Fer	2 %



Control



50% Whole Yellow Pea/50% Split Red Lentil



50% Whole Yellow Pea/50% Pre-Cooked Navy Bean



50% Split Red Lentil/50% Pre-Cooked Navy Bean

### CONTACT US

To learn more about the Cigi Developing Gluten-Free Products using Pulse Ingredients Project or to discuss your application needs please contact:

**Heather Maskus, M.Sc.**

Project Manager

Pulse Flour Milling and Food Applications

Tel: (204) 984-3139

hmaskus@cigi.ca

Funding provided by The Alberta Agriculture Funding Consortium and AAFC's Agri-Innovation Program.

