

ALLAND & ROBERT

**FORMULATING
BISCUITS
WITH ACACIA GUM**

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INTRODUCTION

According to market intelligence, the global biscuits market was evaluated at 106 billions USD at the end of 2020*. Depending on where you are on the globe, biscuits can be different, but they are most often a variety of baked products made from flour, milk, and/or water. These products are extremely popular and even though their sensory and texture characteristics can differ, they are convenient, have long shelf life and provide a great experience to consumers. However, biscuits can also have a very low nutritive value as they are generally made with wheat flour and have high glycemic index. In this situation, fibre enrichment and sugar reduction are concrete solutions to add nutritional value to baked products in general, and meet the consumers' expectations.

As a leading manufacturer of acacia gum worldwide, Alland & Robert worked on the formulation of biscuits with acacia gum, which is a prebiotic fibre, and measured its impact of various criteria such as sugar content, texture, appearance or sensory experience. Our research showed that biscuits with acacia gum are generally preferred and categorized as "high quality" in sensory analysis. Their characteristics and nutritional value are improved, compared to their control recipes without acacia gum. The addition of acacia gum is particularly interesting when combined with sugar reduction, which is today an strong requirement from customers all over the world. In a word, acacia gum helps formulating healthy, clean and natural biscuits & baked products.

* <https://www.marketresearchfuture.com/reports/biscuits-market-1918>

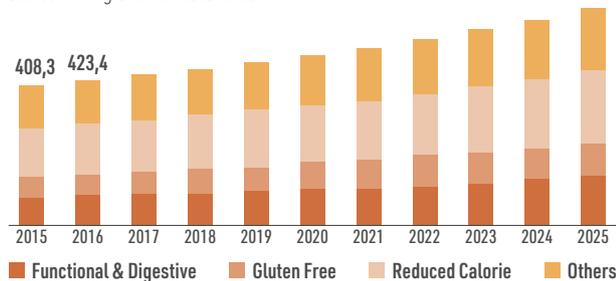
1 THE MARKET OF BISCUITS

The global biscuit market has been constantly growing over the last few years and is expected to reach USD 154.86 billion by 2028⁽¹⁾. The global high fibre biscuit market has grown at a CAGR (Compound Annual Growth Rate) of 7,3% during the period 2007-2021, reflecting the expectations of consumers for healthier, nutritious options in this segment.

Most manufacturers focus on improving the nutritional profile of their products, including adding more fibre and reducing the sugar content. Other options include going organic, eliminating unhealthy ingredients and offer gluten-free options.

U.S. healthy biscuits market size, by type, 2015 - 2025 (USD Million)

Source: www.grandviewresearch.com



Despite a huge expectation from consumers to deliver on indulgence, biscuit consumption patterns show that the most natural and healthy options are the propositions preferred by consumers all over the world who want to preserve their health and create better eating habits. For example, in the United States the segments of reduced-calories biscuits and functional & digestive biscuits are growing⁽²⁾.

51% of Thai consumers are interested in biscuits with **added functional benefits**

57% of German adults say they would be interested in choosing a **healthier sweet biscuit**

34% of US category users would pay more for crackers with **health orientated ingredients**

35% of Brazilian consumers see **natural ingredients as more premium**

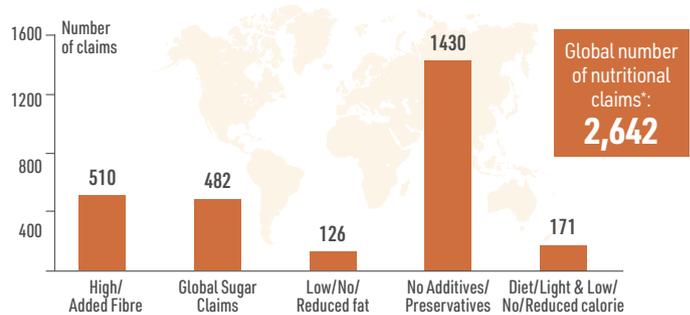
Source: Mintel

Texture, taste and sensorial experience remain key, especially for the younger consumers. Consumers' desires for innovative ideas or textures appear in the biscuit aisles. According to Mintel, among launches of products worldwide, high fibres claim is one of the most prevalent, as well as sugar reduction and claims related to shorter list of ingredients such as "no additives".

Acacia gum is perfectly in line with these trends observed in the biscuit segments, thus becoming an efficient and appealing ingredient to use in formulation of innovative and trending baked products.

Biscuits/Cookies/Crackers nutritional claims from Jan to Sept 2021 - Worldwide

Source: Mintel



* Products with 2 or more claims count twice or more.

(1) <https://www.globenewswire.com/news-release/2021/05/27/2237883/0/en/Global-Biscuit-Market-Is-Expected-to-Reach-USD-154-86-billion-by-2028-Fior-Markets.html>

(2) https://agriexchange.apeda.gov.in/Weekly_eReport/Biscuit_%20Report.pdf

2 PRESENTATION

Acacia gum is odorless, tasteless and colorless. It has a low calorific value which makes it ideal for dietary applications and supplements, for fibre enrichment purposes. Acacia gum is easy to use: heat is not required to activate its functionality, and it has a low viscosity while being highly compatible with many other ingredients and processing conditions.

In addition, acacia gum is a prebiotic fibre, has a positive impact on digestive health and helps lowering the glycemic index of foods. It can be used in many different diets such as keto, low FODMAP, vegan, etc.



ACACIA GUM IS:



- ✓ Natural
- ✓ Vegetal
- ✓ Clean Label
- ✓ An exudate of African acacia trees
- ✓ Sustainable
- ✓ A soluble prebiotic fibre

LABELLING:



- ✓ Acacia Gum / Gum Acacia
- ✓ Acacia Fibre
- ✓ Gum Arabic
- ✓ E414



Low FODMAP



Acacia gum is a low FODMAP ingredient which means it is particularly ideal for people with irritable bowel syndrome.

FODMAP stands for Fermentable Oligosaccharides, Disaccharides, Monosaccharides And Polyols: these short chain carbohydrates are poorly absorbed in the small intestine and can ferment in the colon, causing digestive discomforts and issues in some people.



EMULSION

Emulsifying properties and stabilization



TEXTURING

Better textures and hardness



FIBRE ENRICHMENT

90% fibre content, highly soluble



MOUTHFEEL IMPROVEMENT

Softening action and longer taste



COATING

Film forming abilities, perfect for gumming operations



NATURAL GLUE

Safe and organic food adhesive



ENCAPSULATION

Flavor retention, protection and use as a carrier



EXTRUSION

Processing aid, gustatory sensation improver

3 BENEFITS OF FORMULATING BAKED GOODS WITH ACACIA GUM

In order to evidence the benefits of acacia gum in the formulation of biscuits, Alland & Robert conducted tests and batches produced in standard industrial conditions with professional equipment for some of the recipes.

Alland & Robert worked with the LEMPA (*Laboratoire d'Essais des Matériels et Produits Alimentaires/ Laboratory for the testing of food products*), a French and independent expert and professional laboratory specialized in bakery based in Rouen-France.

Alland & Robert also worked with AGIR (*Agro Alimentaire Innovation Recherche / Agro Innovation Research*) a technological platform specialized in bakery and pastry innovation.

These tests helped to validate the use and dosage of acacia gum in baked goods. In addition, Alland & Robert gathered

detailed knowledge and insight in order to provide efficient and tailor-made technical assistance to the manufacturers of this industry.

In addition, Alland & Robert laboratory studied a variety of recipes with instrumental and sensory analysis. This was essential to be able to characterize the effects of acacia gum in several types of biscuits and diets. Recipes included cookies, shortbreads, wafers, crackers, with vegan and keto options.

References described to in this paper refer to Alland & Robert grades:

ORGANIC SEYAL GRADE: Acacia Fibre 339

ORGANIC SENEGAL GRADE: Acacia Fibre 399

These references are also available in conventional grades.



3 different examples of biscuits with acacia gum



Traditional wafers

Ingredients (in % weight)

Egg white	12,0
Egg yolk	8,0
Flour	38,0
Sugar	14,0
Butter	25,0
Acacia Fibre 399	3,0

Instructions

- 1/ Solubilize acacia gum in the egg yolk.
- 2/ Using a food processor and a flat beater, mix the melted butter, sugar, egg yolk & gum acacia, and flour for 2 min at medium speed.
- 3/ Beat the egg whites and add them to the mixture, mix for 30 seconds at low speed.
- 4/ Scrape with a spatula and mix again for 30 seconds at medium speed.
- 5/ Oil the plates of the waffle iron and cook each wafer for 3 min.



Vegan shortbreads

Ingredients (in % weight)

Margarine	19,7
Sugar	10,6
Flour	45,5
Almond powder	7,6
Plant based milk	10,6
Almond puree	3,0
Acacia Fibre 399	3,0

Instructions

- 1/ In a bowl, combine all the ingredients and work the dough to obtain a ball of dough.
- 2/ Spread thinly on a floured work surface, then cut out with a cookie cutter according to the chosen shape.
- 3/ Bake on a sheet of baking paper at 175° C until the cookies are colored.



Keto-friendly cookies

Ingredients (in % weight)

Ground hazelnuts	24,8	Coconut oil	20,7
Ground almonds	24,8	Maple syrup	5,0
Cinnamon powder	0,8	Liquid vanilla	1,9
Baking powder	1,7	80% dark chocolate	16,5
Salt	0,1	Acacia Fibre 399	3,7

Instructions

- 1/ Preheat the oven to 200° C (th. 7).
- 2/ Combine the ground almonds and hazelnuts, cinnamon, baking powder and salt. Add acacia gum and mix well.
- 3/ Add the coconut oil, maple syrup and vanilla, mix to incorporate.
- 4/ Add the chocolate cut into small pieces.
- 5/ Take piles of dough the size of a walnut, shape into balls and place them flat on the baking sheet lined with parchment paper, spacing them a few centimeters apart.
- 6/ Cook in the oven for 8 min, leave to cool for a few moments then transfer to a rack until completely cooled.

Technological benefits

Technological benefits appear not only on finished products but also in the dough and in the process. The formation of a smooth and homogeneous dough with a developed gluten structure (except for gluten-free products) is essential to a

successful recipe and consumption experience. So are the processes of mixing, dividing, moulding and baking, and acacia gum will help improve these operational steps as well as the final product quality.

In the DOUGH

- Improved **cohesion, flexibility** and **elasticity**
- Decrease of **friability**
- Better **dough hydration** over time

In the PROCESS

- Better **dough machinability**, dough more suitable for the lamination process
- Reduced **shrinkage** and **deformation of biscuits** during baking
- Improved **coloring** of biscuits during baking

In the END PRODUCT

- Improved **crispness**
- Improved **hardness & better resistance** to breaks
- Better **sensory perception: taste and sweetness**
- Moisture stabilisation**

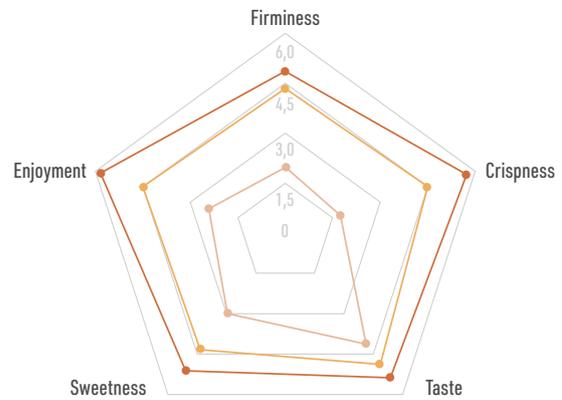
Sensory benefits : results on shortbreads and wafers

Sugar reduced shortbreads



● -30% Sugar / + 3% ACACIA FIBRE 339 ● -30% Sugar ● Full Sugar

Sugar reduced wafers



● -30% Sugar / + 3% ACACIA FIBRE 339 ● -30% Sugar ● Full Sugar

The addition of acacia gum in sugar reduced baked products (-30% sugar compared to traditional recipes) helps to compensate the loss of sweetness, crispness and color. An addition of 3% acacia gum allows the recipes to have sensory profiles comparable to traditional recipes

with regular sugar content. Adding acacia gum to the biscuits positively influences the tested parameters by improving the sensory characteristics. It preserves the organoleptic quality of the products and improves their overall acceptability.



Classic Shortbread

Instructions

Equipment : stand mixer with flat beater.

1/ Mix the butter, sugar and salt for 4 min.

2/ Solubilize Acacia Fibre in the eggs and add it to the dough. Mix for 4 min.

3/ Add flour and baking powder, then mix 2 min at low speed.

4/ Let to rest for about 30 min à 25°C.

5/ Rolling process : 4 mm thick

6/ Die cutting : 50 mm size.

7/ Bake 9 min at 170°C.

Ingredients (in % weight)

Butter	16,4	Liquid eggs	15,4
Sugar	12,2	Flour	52,5
Salt	0,3	Baking powder	0,2
Acacia Fibre 339	3,0		

Texture benefits

Acacia gum has been traditionally used for texturing benefits in baking. Texture is an essential characteristic of cookies and biscuits in general, as it brings a huge part of the sensory experience to the consumer! In addition, a perfect texture is not easy to achieve if manufacturers are committed to using only natural, clean label or healthy ingredients. It's even more challenging if they add constraints such as gluten-free, vegan, sugar-free, etc.

Consumers today are looking for healthier options, but do not want to compromise on taste or sensory experience! Biscuits manufacturers must look for natural ingredients that help texture and stabilize their products, all without modifying flavor, taste or smell. And that's how acacia gum has become popular in biscuit formulations. Adding acacia gum to a recipe will modify the moisture balance and improve crispness when incorporated in a sugar-reduced biscuit.

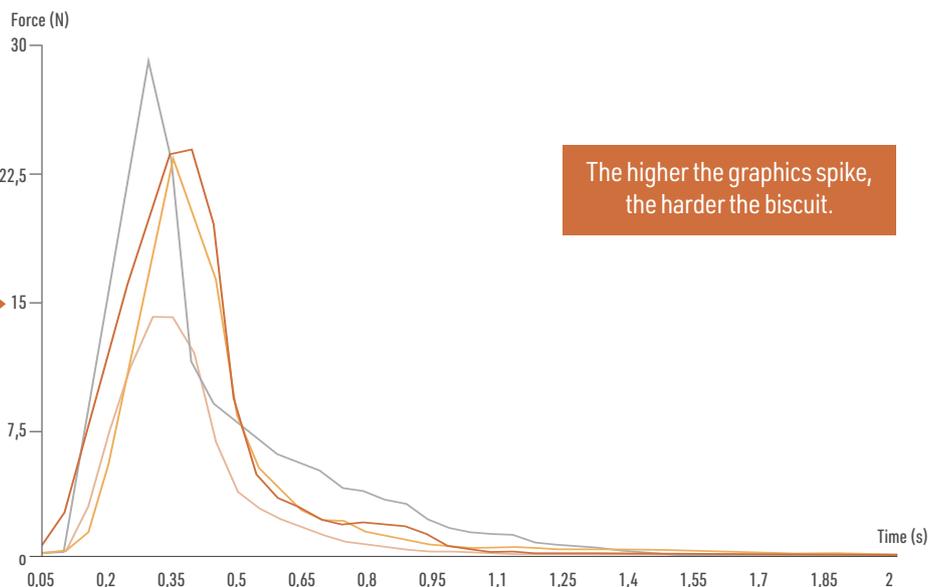
Shortbread break resistance analysis by texturometer

The loss of break resistance created by the sugar reduction is compensated by the addition of 3% acacia gum.

Hardness is significantly increased by the addition of acacia gum.

Biscuits are more crunchy.

- Full Sugar
- -30% Sugar
- -30% Sugar + 3% ACACIA FIBRE 339
- -30% Sugar + 6% ACACIA FIBRE 339



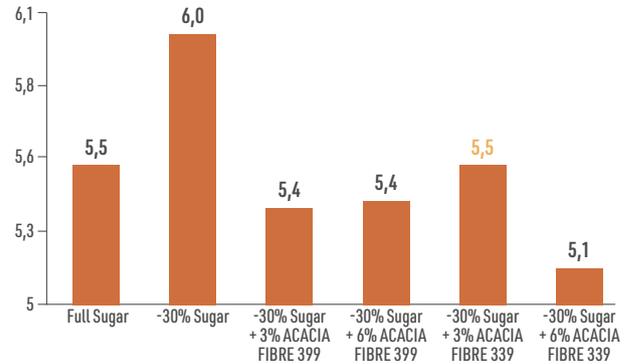
The higher the graphics spike, the harder the biscuit.

Moisture benefits

Generally, sugar reduced biscuits with acacia gum have a similar moisture content versus control biscuits.

The reduction of sugar content can alter the moisture balance of biscuits and penalize their crunchiness. The addition of acacia fibre helps to rebalance the products and preserves their texture.

Shortbreads : moisture content after 12 days (%)



Fibre enrichment benefits

Baked products nutritional profile can be improved by adding prebiotic fibre such as acacia gum, which belongs to the group of dietary fibres with high intestinal tolerance and prebiotic effect. Acacia gum is allergen-free and GMO-free, and it does not present other fibres usual disadvantages such as discomfort, side effects, unnatural synthetic additive or viscosity addition to the end product. In addition, it is very low in calories and helps decrease the glycemic index of food products.

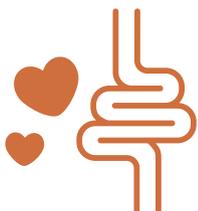
Acacia Gum / Acacia Fibre benefits

- ✓ Resistance to acidity and heat
- ✓ No side effect
- ✓ Scientifically proven prebiotic effect
- ✓ Positive impact on gut health
- ✓ Neutral taste with very low viscosity
- ✓ Low calorific value that is ideal for dietary use
- ✓ pH compatible with milk proteins
- ✓ Positive effect on rheology

Acacia gum can also be called and labelled Acacia Fibre, as they are the same additive (or ingredient). Alland & Robert offers a specific range of acacia gum called Acacia Fibre, which guarantees a minimum of 90% fibre content (international method AOAC 985-29).



Adding acacia gum in formulation can allow nutritional allegations such as "source of fibres" or "high fibres" depending on the dosage and the regulation of every country.



GUT HEALTH

Alland & Robert studied the positive effects of acacia gum on gut health. For more details, the results of our study can be requested at:

<https://www.allandetrobert.com/acacia-gum-and-gut-health/>

How to improve the Nutri-Score of your recipe?

The Nutri-Score has been adopted by numerous countries in Europe, and similar systems exist in other countries, such as Health Star in Australia. Nutritional labelling is very much liked by consumers, as it is one of the best tools they have at their disposal to make informed, healthy choices. For food manufacturers, the Nutri-Score is becoming a simple but essential key to take into account when formulating innovative products: it is encouraging them to improve the nutritional value of their products!

However, taking into account the positive and risk nutrients in a formulation can easily become a headache! In order to help food manufacturers formulate healthier biscuits and baked products, Alland & Robert has researched the impact of adding acacia gum and reducing sugar on the Nutri-Score. A demonstration of the positive impact of acacia gum in a recipe can be seen in the multigrain biscuit recipes examples below.

NUTRI SCORE, A SYSTEM TO RATE THE NUTRITIONAL QUALITY OF FOODS



The Nutri-Score, also called 5-Colour Nutrition label, is a European rating system displayed on food products in order to convey information on the nutritional quality of foods. It takes into account both nutrients to limit (calories, saturated fat, sugars and salt) and elements to favour (fibre, proteins, nuts, fruits and vegetables). Food products are assigned a colour (from green to red) and letter (from A to E) based on the resulting score, calculated per 100g or 100ml.

Example of a multi-grain biscuit

- 1/ Mix Acacia Fibre in eggs, then mix all ingredients together.
- 2/ Shape "pucks" about 1cm thick in silicone moulds. Cook 14 min at 180°C.
- 3/ Unmould the biscuits and let them cool. Store in a sealed tin.



	CONTROL RECIPE	RECIPE WITH -30% SUGAR REDUCTION	RECIPE WITH 3% ACACIA FIBRE AND -30% SUGAR REDUCTION
	NUTRI-SCORE A B C D E	NUTRI-SCORE A B C D E	NUTRI-SCORE A B C D E
Flour	23,3	28,6	25,6
Brown sugar	11,8	6,5	6,5
Colza oil	13,2	13,2	13,2
Egg	16,5	16,5	16,5
Oatmeal	24,8	24,8	24,8
Baking powder	0,5	0,5	0,5
Raisins	8,0	8,0	8,0
Sunflower, chia & sesame seeds	1,9	1,9	1,9
Vanilla & cinnamon flavours	0,05	0,05	0,05
Acacia Fibre 339	0,0	0,0	3,0
Total	100,0	100,0	100,0
NUTRITIONAL VALUES (100G)			
Energy (en Kcal/100g)	431,4	429,6	424,8
Energy (en kJ/100g)	1806,0	1798,7	1778,7
Fat (g/100g)	19,5	19,6	19,6
Saturated fat (g/100g)	2,0	2,0	2,0
Carbohydrates (g/100g)	53,1	51,5	49,1
Sugar (g/100g)	19,1	13,4	13,3
Fibres (g/100g)	4,3	4,5	7,3
Proteins (g/100g)	9,1	9,7	9,4
Salt (g/100g)	0,33	0,33	0,33
	SOURCE OF FIBRES*	SOURCE OF FIBRES*	HIGH FIBRES*
		SUGAR REDUCED* Or -30% SUGAR*	SUGAR REDUCED* Or -30% SUGAR*

Allegations*

* Nutritional allegations can vary according to dosage and the legislation of the country and must always be checked.

ALLAND & ROBERT

WE ARE YOUR EXPERT OF ACACIA GUM.

Created in 1884, Alland & Robert is a family company and a leader in tree exudates, with a strong focus on acacia gum. Alland & Robert's main focus is on customized R&D, customer service and partnerships with internationally recognized universities.

Alland & Robert exports to over 70 countries through a network of 40 distributors. With the aim of providing high-quality natural gums, Alland & Robert is fully committed to sustainable growth in line with its active corporate social responsibility plan. This vision is supported by a large network of raw material suppliers in Africa, ethical sourcing and compliance with international certifications.



	R&D STRONG EXPERTISE		INTERNATIONAL CERTIFICATIONS
	SUPPLIER NETWORK FOR SUPPLY SAFETY		CUSTOMIZED CUSTOMER SERVICE
	CORPORATE RESPONSIBILITY		INTEGRATED SUPPLY CHAIN

OUR PRODUCTS CERTIFICATIONS



Our products are halal and kosher certified, more information upon request.



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