

“Global Sweetener and Sugar Landscape”

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“Sugarcane Landscape”



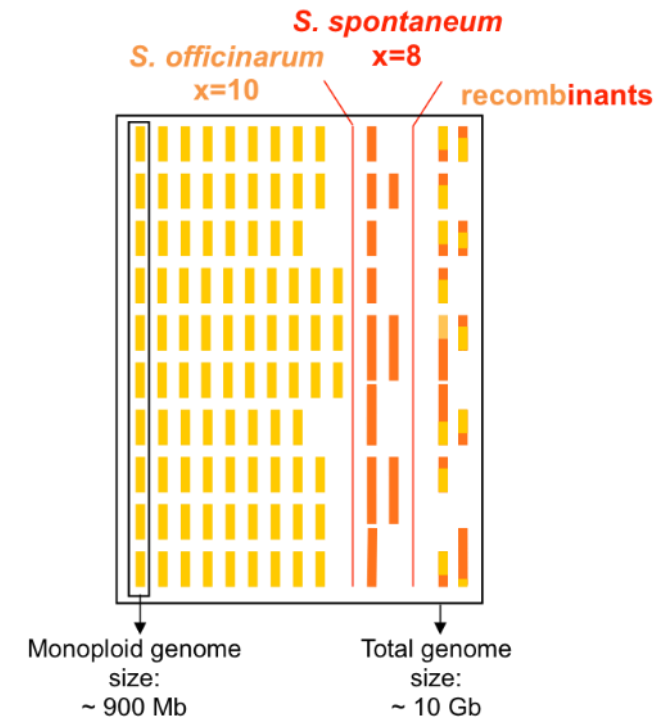
❖ Agriculture

❖ Genome Sequenced



A mosaic monoploid reference sequence for the highly complex genome of sugarcane

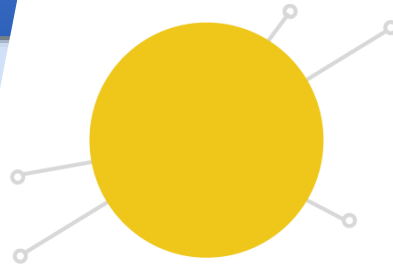
In 2018 CIRAD, France released the 1st fully sequenced reference genome of sugarcane.





❖ Agriculture

- ❖ Genome Sequenced
- ❖ **AI Breeding Program**



BENSON•HILL
BIOSYSTEMS™

Benson Hill developed an AI powered, predictive breeding platform (CropOS).

- ❖ Reduces new variety time to market by 50% to 75%.
- ❖ Demonstrated yield increases of 12% to 15% in corn.



CropOS™



❖ Agriculture

- ❖ Genome Sequenced
- ❖ AI Breeding Program
- ❖ **GMO - Brazil**



June 2017, Brazil approves the commercial use of GMO Sugarcane.

Bt Sugarcane is resistant to sugarcane borer (*Diatraea saccharalis*).





❖ Agriculture

- ❖ Genome Sequenced
- ❖ AI Breeding Program
- ❖ GMO – Brazil
- ❖ **Genetic Engineered**



Researchers engineered sugarcane to produce oil in its leaves for biodiesel.¹

- ❖ Modified plants produced oil (13%) and increased sugar yield.



❖ Agriculture

- ❖ Genome Sequenced
- ❖ AI Breeding Program
- ❖ GMO – Brazil
- ❖ Genetic Engineered
- ❖ **Smart Ag**

Robotics use in agriculture has reached every stage of the process.



Drones

Spray / Weeding

Harvesting

“Sugar Landscape”





NO SUGAR



- ❖ Agriculture
- ❖ Global Trends
- ❖ **Saccharophobia**

Saccharophobia Definition: Fear of sugar, and sugary foods and drinks.

- ❖ Common causes are related to the potential negative health effects of sugar.



We have been here before with singling out food components for causing large health problems.

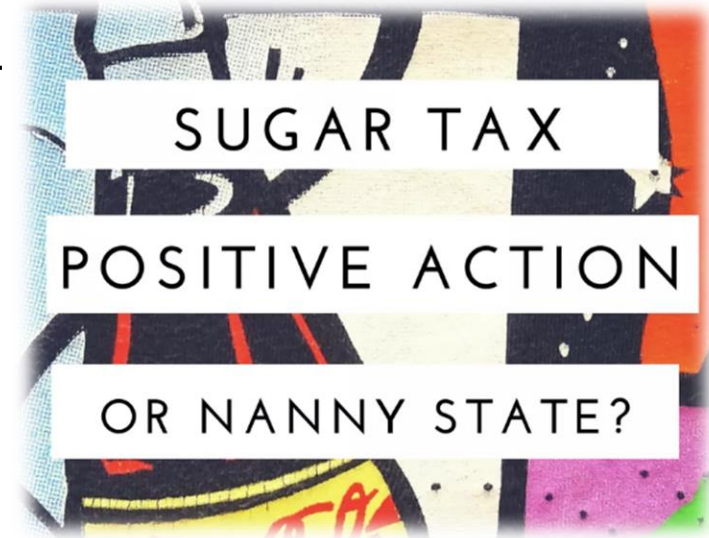




- ❖ Agriculture
- ❖ Global Trends
- ❖ Saccharophobia
- ❖ **Sugar Taxes**

As of 2018, **20 countries** have implemented sugar taxes on beverages.

- ❖ 2014 Mexico put a 10% sugar tax on sugary beverages, reducing consumption by 12% in 2 years.¹
- ❖ Targeting one food ingredient (Sugar) as the cause of obesity is misleading while fat contributes 1.75X more calories/serving.

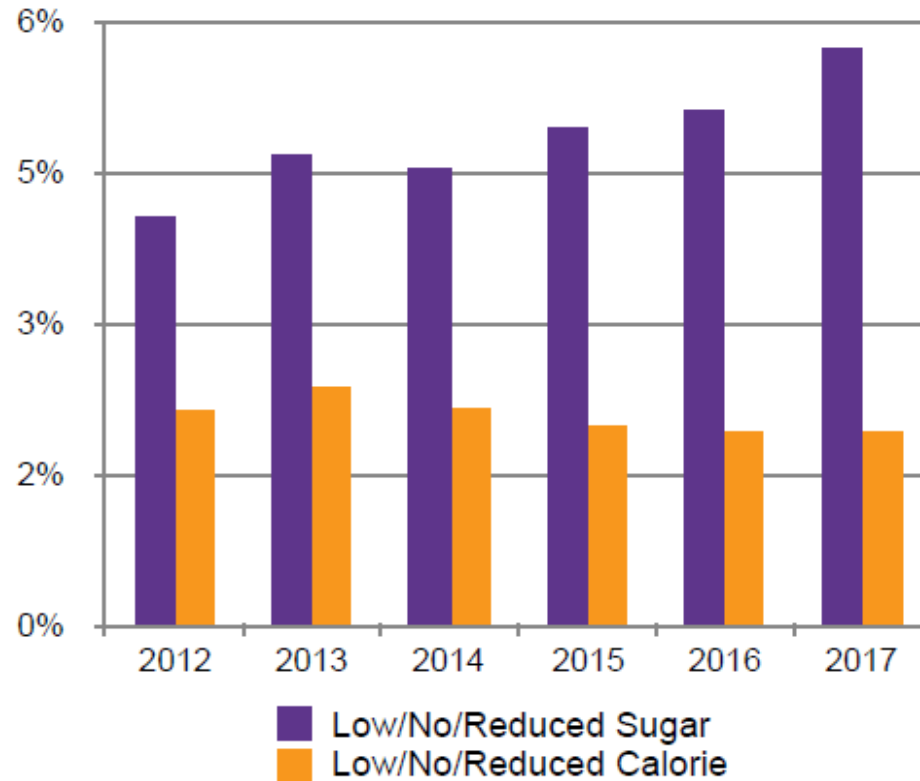


1. Ng, S., et al (2019). *Publi Health Nutr.*

New Products Launched: Reduced Sugar Claim

- ❖ Agriculture
- ❖ Global Trends
- ❖ Saccharophobia
- ❖ Sugar Taxes
- ❖ **Added Sugar**

Low sugar and low calorie claims, global, 2012-June 2017



Current Label:	
Nutrition Facts	
Serving Size 2/3 cup (55g) Servings Per Container About 8	
Amount Per Serving	
Calories 230	Calories from Fat 72
% Daily Value*	
Total Fat 8g	12%
Saturated Fat 1g	5%
Trans Fat 0g	
Cholesterol 0mg	0%
Sodium 160mg	7%
Total Carbohydrate 37g	12%
Dietary Fiber 4g	16%
Sugars 1g	
Protein 3g	
Vitamin A	10%
Vitamin C	8%
Calcium	20%
Iron	45%
* Percent Daily Values are based on a 2,000 calorie diet. Your daily value may be higher or lower depending on your calorie needs.	
Total Fat	Less than 65g 80g
Sat Fat	Less than 20g 25g
Cholesterol	Less than 300mg 300mg
Sodium	Less than 2,400mg 2,400mg
Total Carbohydrate	300g 375g
Dietary Fiber	25g 30g

New Label:	
Nutrition Facts	
8 servings per container	
Serving size 2/3 cup (55g)	
Amount per serving	
Calories 230	
% Daily Value*	
Total Fat 8g	10%
Saturated Fat 1g	5%
Trans Fat 0g	
Cholesterol 0mg	0%
Sodium 160mg	7%
Total Carbohydrate 37g	13%
Dietary Fiber 4g	14%
Total Sugars 12g	
Includes 10g Added Sugars	20%
Protein 3g	
Vitamin D 2mcg	10%
Calcium 260mg	20%
Iron 8mg	45%
Potassium 235mg	6%
* The % Daily Value (DV) tells you how much a nutrient in a serving of food contributes to a daily diet. 2,000 calories a day is used for general nutrition advice.	

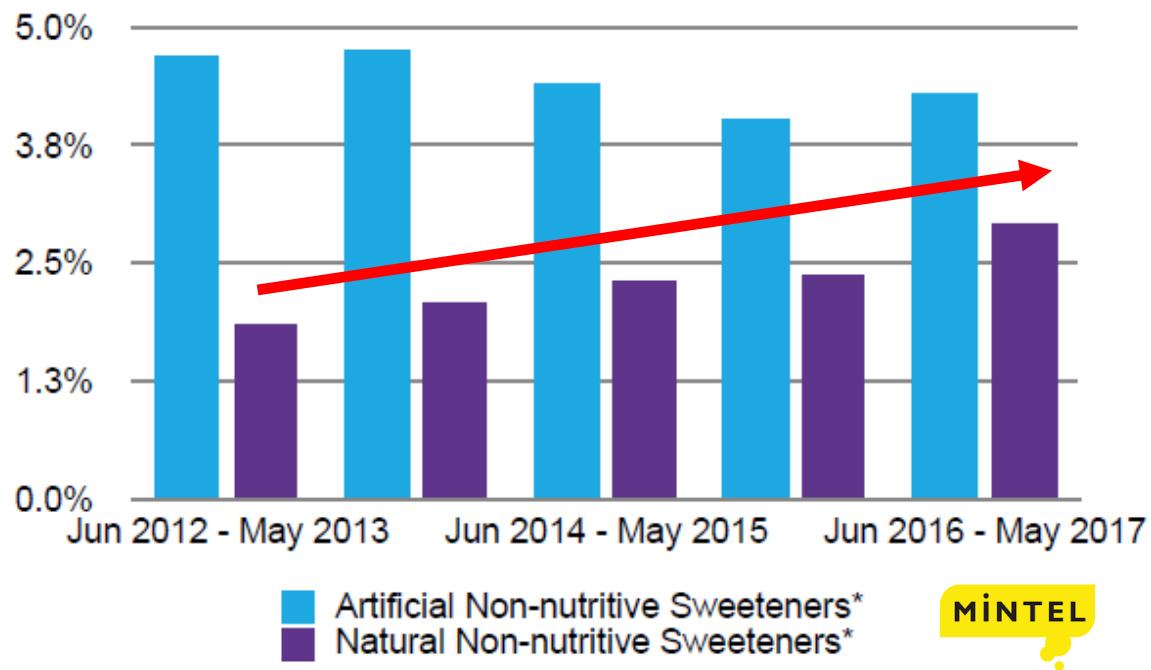
❖ The addition of added sugar labeling and taxes is driving the increase in new product launches.

❖ Agriculture

❖ Global Trends

- ❖ Saccharophobia
- ❖ Sugar Taxes
- ❖ Added Sugar
- ❖ Demand Natural

Percentage of launches that contain non-nutritive sweeteners, all food and drink, US, June 2012 - May 2017



- ❖ APAC's demand for natural sweeteners will grow at a CAGR of 5.3%¹ faster than the EU or the Americas.

1. BusinessWire, 2017



- ❖ Agriculture
- ❖ Global Trends
 - ❖ Saccharophobia
 - ❖ Sugar Taxes
 - ❖ Added Sugar
 - ❖ Demand Natural
 - ❖ **Clean Label**

A new framework for Clean Label



Ingredients

- Free-from artificial flavors, colors, and allergens
- No-no lists
- Recipe-like ingredient lists

Nutrition

- Removal of negatives (e.g., sugar)
- Addition of positives (e.g., protein)

Sustainability

- Organic, Non-GMO
- Ethical production and business practices
- Reduction in waste and packaging



Use of ethical human, animal, and environment claims for **Asian launches as a whole had a CAGR of 54% over the 2013-2017 period.**¹



DIABETES FRIENDLY



TASTES LIKE SUGAR



TUMMY FRIENDLY



TOOTH FRIENDLY



BAKES LIKE SUGAR



NON-GLYCEMIC



GLUTEN FREE



MEASURES LIKE SUGAR

- ❖ Agriculture
- ❖ Global Trends
- ❖ Challenge
 - ❖ Sugar Replacement

Sugar has Functionality beyond Sweetness

	Sweetness	Browning	Crystallization		Viscosity/Bulking		Calories
	Relative Sweetness	Maillard Reaction	Melting Point (°C)	Glass Transition Temp (°C)	Viscosity (25°C)	Solubility w/w% (25°C)	kcal/g
Sucrose	1	None	186	52-69	Low	67	4
Erythritol	0.65	None	121	-42	Very Low	37-43	0.2
Sucralose	600	None	130		Low	28.2 (20°C)	0
Allulose	0.7	High	109	-6.5	Lower than Sucrose	74	0.2
Aspartame	180	Low	245-247		Very Low	1	0

- ❖ There is no single sugar replacement with same functional diversity as sucrose.
- ❖ Select sugar replacement based on product need.

- ❖ Agriculture
- ❖ Global Trends
- ❖ Challenge
 - ❖ Sugar Replacements
 - ❖ Zero Calorie

Zero Calorie, High Intensity Sweeteners (HIS)

- Aspartame
- Sucralose
- Saccharin
- Neotame



- ❖ APAC still seeing growth for HIS (CAGR 4.6%¹) while the EU and Americas are (CAGR 1%²).
- ❖ Growth in beverages

35% 

of US consumers agree
artificial sweeteners are bad for your health.



Nestlé

Leader in Sugar Replacement



- ❖ Agriculture
- ❖ Global Trends
- ❖ Challenge
 - ❖ Sugar Replacement
 - ❖ Zero Calorie
 - ❖ **Sugar Research**

- ❖ Developed a new way to produce chocolate with no added sugar.
- ❖ Uses the cocoa pulp to sweeten the chocolate.
- ❖ Why are Sugar Manufacturers not leading this R&D?



- ❖ Agriculture
- ❖ Global Trends
- ❖ Challenge
- ❖ Natural Rush
- ❖ **Stevia**

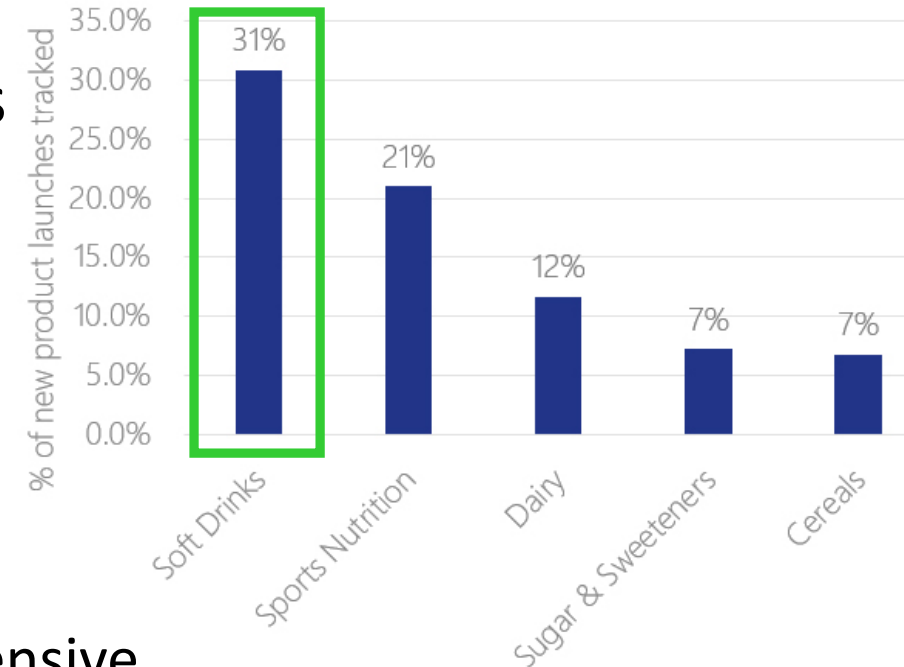
Beverage applications are driving growth.

- ❖ Global growth rate CAGR of 7.9%¹

Challenges

- ❖ Natural extraction is expensive.
- ❖ Requires blending with bulking agents for bakery applications.
- ❖ Perceived as bitter.

Top market categories as percentage (%) of new F&B launches tracked with stevia ingredient (North and Latin America, 2017)



Sources: Innova Market Insights



1. Market Watch, 2019 2. Allied Market Research, 2017



- ❖ Agriculture
- ❖ Global Trends
- ❖ Challenge
- ❖ Natural Rush
 - ❖ Stevia
 - ❖ **MonkFruit**

Monkfruit sweetener

- ❖ *Lo han guo* or Swingle fruit (*Siraitia grosvenorii*)

Used in **beverage and confectionary applications.**






- ❖ Agriculture
- ❖ Global Trends
- ❖ Challenge
- ❖ Natural Rush
 - ❖ Stevia
 - ❖ MonkFruit
 - ❖ **Yacón**

Yacón (*Smallanthus sonchifolius*)

- ❖ Root grown in cold climates
- ❖ High in Fructo-oligosaccharides
- ❖ New to the market



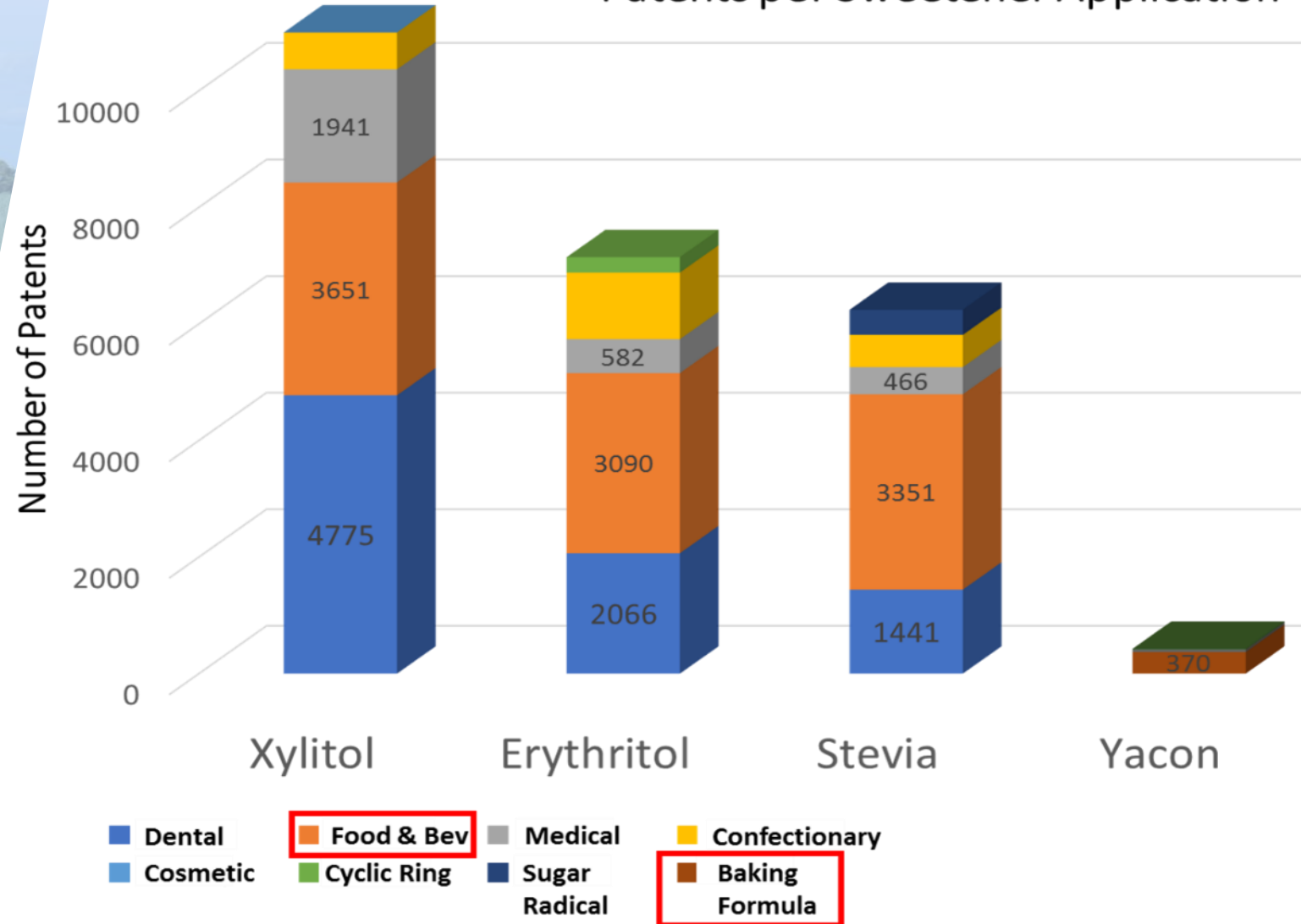
HEALTH BENEFITS OF YACON Organic Facts

- Aids in weight loss
 - Helps to prevent cancer
 - Aids in managing diabetes
 - Lowers levels of bad cholesterol
 - Reduces strain on cardiovascular system
 - Helps to reduce constipation, bloating and gastric ulcers
 - Prevents fat accumulation in liver and maintains proper liver health
- 



- ❖ Agriculture
- ❖ Global Trends
- ❖ Challenge
- ❖ Natural Rush
- ❖ Stevia
- ❖ MonkFruit
- ❖ Yacón
- ❖ **Patents**

Patents per Sweetener Application





MITR PHOL
Innovation &
Research Center

sugar 2.0





Why Blend?

- ❖ Agriculture
- ❖ Global Trends
- ❖ Challenge
- ❖ Natural Rush
- ❖ **Blends**

- ❖ Increase applications of natural sweeteners.
- ❖ Create added value.
- ❖ Emulate functional characteristics of sugar.





Blends for Function

- ❖ Agriculture
- ❖ Global Trends
- ❖ Challenge
- ❖ Natural Rush
- ❖ **Blends**

Create a product that can replace sugar at 1:1

Zero Calorie Sugar Replacement for brown sugar for baking.

Ingredients:

- ❖ Erythritol
- ❖ Prebiotic Oligosaccharides
- ❖ Fruit Juice Concentrate (for Color)
- ❖ Natural Flavors
- ❖ Vegetable glycerin



ZERO NET CARBS. THE INGREDIENTS IN SWERVE DO NOT AFFECT BLOOD SUGAR, SO THE CARBOHYDRATES IT CONTAINS ARE CONSIDERED NON-IMPACT.

Directions for use: Add to your favorite food or beverage. Measures like brown sugar. Store in a cool, dry place.



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GLUTEN FREE



MEASURES LIKE SUGAR



- ❖ **Agriculture**
- ❖ **Global Trends**
- ❖ **Challenge**
- ❖ **Natural Rush**
- ❖ **New Processes**
- ❖ **Conclusion**

- ❖ New agriculture crops and technologies will improve farmers livelihoods.
- ❖ High intensity sweeteners are limited in their applications.
- ❖ Blends will have a significant role in developing sugar replacements.
- ❖ Sugar producers have an opportunity to create new revenue streams by capitalizing on Global Trends.



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THANK YOU

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