NNFCC News Review

Biobased Products

Each month we review the latest news and select key announcements and commentary from across the biobased chemicals and materials sector.

The Bioeconomy Consultants
NNFCC

YOUR PARTNERS FOR BUSINESS INSIGHT AND MARKET INTELLIGENCE

Providing clients with a strategic view of feedstock, technology, policy, and market opportunity across the bioeconomy

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Foreword

Welcome readers, to this month's Biobased Products News Review.

The Plant kingdom has always been a great source of medicinal compounds. For millennia, humans have used plants to cure a range of ailments, and although modern synthetic chemistry now occupies a significant share of the pharmaceutical market, more than 100 active plant-derived ingredients are still used in modern medicines. More specifically, nowadays plant-derived molecules can be purified from their original source (flowers, roots, leaves or other plant tissues), or can be modified to improve their efficacy and make them more appropriate for human use. Common examples include analgesics like morphine and codeine – made from poppy – and antimalarial treatments like quinine – derived from the quinine tree. Other examples include cancer treatments such as Taxol and Vinblastine which are derived from the bark of the Pacific yew tree and the periwinkle plant respectively.

Recently, GW Pharmaceuticals has announced the development of its new cannabis-based EPIDYOLEX® drug for use as an adjunctive treatment of seizures associated with Tuberous Sclerosis Complex (TSC), which is mainly diagnosed in young children. The drug has been approved both by the European Union and the U.S. FAD. GW Pharmaceuticals focuses on the development of cannabis-based medicines and has so far distributed its medicines to thousands of patients around the world, with great success. These recent findings show that the natural world still remains a source of inspiration and of life-changing molecules.

Plants are not the only natural source of medicinal compounds still being used in modern pharmacology. Diabetes treatments are a prime example of this, as artificial insulin is manufactured through microbial fermentation. Diabetes being a very widespread disease – expected to increase in the years to come – there is no doubt that microbial-derived medicines remain a crucial asset for the global healthcare sector.

Natural compounds can also find applications in other areas associated to pharmaceuticals. For instance, the company Biosynthetic® Technologies has developed a biobased oil-derived estolide excipient and active drug delivery vehicle which has found a purpose in diabetes testing applications. This compound has the added benefit of being biodegradable, non-toxic and non-bioaccumulative, which speaks to the company's strong sustainability commitment.

Read on for the latest news.

Markets

Circa Successfully Completes €56 Million IPO, Starts Trading on Euronext Growth Oslo

Biochemicals company Circa Group AS has successfully completed a private placement of 575 Norwegian Kroner (NOK) – approximately €56 million – in a transaction led by Pareto Securities and Sparebank 1 Markets in Oslo, at a post-money market valuation of approximately NOK 2 billion (approximately €194 million). The company shares started trading on Euronext Growth Oslo at 09:00 CET on 2nd March 2021.

The private placement attracted strong interest from high-quality and global institutional investors and was more than 15 times oversubscribed (excluding pre-allocated shares). Cornerstone investors include BNP Paribas Energy Transition Fund, Delphi Fondene, DNB Asset Management, Handelsbanken Fonder, The Fourth Swedish National Pension Fund, Robeco Asset Management and Circa's industrial partner Norske Skog ASA.

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BASF strengthens its position in bio-surfactants for Personal Care, Home Care and Industrial Formulators

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BASF has recently signed two distinct partnerships agreements to expand its global leading position in the bio-based surfactants and actives market. The strategic alliance with ACS includes an equity stake and makes BASF the single largest shareholder. It further entails an exclusive technology cooperation, commercial agreement and product development for sophorolipids, one class of glycolipids, to address the ever-increasing needs of consumers for sustainable, natural and bio-degradable ingredients and actives. The partners have agreed not to disclose financial details regarding the investment.

Through the strategic technology agreement with Holiferm, a UK-based start-up company, BASF establishes an exclusive cooperation to focus on developing and manufacturing sustainable, non-fossil based, fermentation-derived ingredients for other classes of glycolipids with potential for application in Home Care, Industrial Formulators and Personal Care products.

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Transition paths towards a bio-based economy in Germany: A model-based analysis

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The reduction of use of fossil fuels is inevitable for a transformation to a sustainable economy. Developing possible transformation pathways from the current fossil-based to a more bio-based economy and getting a better understanding of driving forces and trade-offs can help to shape the real desirable path. To get a complete picture, general social, economic and policy developments as well as specific developments related to the bio-based economy have to be covered. This article presents a model-based analysis of three different transformation paths to a bio-based economy with a special focus on Germany and a time horizon until 2050 using the general equilibrium model MAGNET.

Results show that 'framing drivers' (e.g. GDP and population developments, trade and land use policies) play an important role and can either significantly encourage or hinder the transformation towards a more bio-based economy. Regarding the biomass, increase in productivity of agriculture and reduction in post-harvest losses are the main factors on the supply side, which help to decrease possible market tensions. On the demand side, the key lever identified in our analysis is the change in consumers' behavior and preferences regarding food. Increased demand for biomass for energy and material use was not identified as a critical factor by the underlying assumptions. To take the most favorable path with less trade-offs, implies, besides the 'wise' policy decisions regarding the support of use of biomass for material and energy use, also the transformation of the whole society, which on its turn should be promoted by policy.

Click here for more information.

Clariant and India Glycols tap into green renewables megatrend by forming joint venture

Clariant, a focused, sustainable and innovative specialty chemical company, and India Glycols Limited (IGL), a leading company in the manufacturing of green technology-based chemicals, has announced a strategic partnership to establish a 51-49% joint venture in renewable ethylene oxide (EO) derivatives.

By combining production and distribution capacity, the joint venture is expected to become a leading supplier of renewable materials to the rapidly growing consumer care market in India and neighboring countries, while providing Clariant the ability to leverage the EO derivatives globally across the home care, personal care and industrial applications segments of its Industrial and Consumer Specialties business. The partnership is subject to customary regulatory approvals.

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GW Pharmaceuticals receives positive CHMP opinion for EPIDYOLEX® for use as treatment of seizures

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GW Pharmaceuticals plc, a world leader in discovering, developing and delivering regulatory approved cannabis-based medicines, has announced that the European Medicines Agency's (EMA) Committee for Medicinal Products for Human Use (CHMP) has adopted a positive opinion on the Company's Type II variation application for EPIDYOLEX® (cannabidiol) as an adjunctive treatment of seizures associated with Tuberous Sclerosis Complex (TSC), for patients two years of age and older.

TSC is a condition that causes mostly benign tumours to grow in vital organs of the body, including the brain, skin, heart, eyes, kidneys and lungs, and in which epilepsy is the most common neurological feature. TSC is typically diagnosed in childhood.

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Bioceres Crop Solutions acquires stake in Moolec Science and enters fast growing alternative food market

Bioceres Crop Solutions Corp., a fully-integrated global provider of crop productivity solutions designed to enable the transition of agriculture towards carbon neutrality, has entered into definitive agreements for the acquisition of a 6% ownership interest in Moolec Science Ltd., a Molecular Farming company pursuing a hybrid concept between plant and cell-based technologies for the production of animal-free food solutions.

Moolec is developing products based on multiple crops to obtain functionalized alternative protein concentrates and isolates. Through genetic engineering, the company aims to produce animal-free solutions at a much lower cost than that offered by existing technologies, by using the scalability of plant-based production systems to leverage the functionality attained through cellular agriculture.

Moolec has developed and fully de-regulated the world's first bovine protein derived from modified safflower grain, a patented technology branded under the SPC name. Through a joint venture subsidiary, Moolec operates a dedicated industrial facility for the production of protein concentrates and oils. Using "plants as bioreactors," Moolec has set its sights on developing other animal proteins and improved oils from crops such as soybeans, peas, wheat, and oat, which can then be formulated into sustainable hybrid meat, dairy, and egg replacements.

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Research & Development

Moleaer's nanobubbles produce more efficient nutrient uptake and water usage

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NovaCropControl, an industry-leading research and testing centre based in the Netherlands, has completed its independent study evaluating the impact of chemical-free nanobubble enriched irrigation water on tomato fruit growth, pathogen control, and nutrient uptake.

In a side-by-side study, NovaCropControl irrigated plants with technology provided by Moleaer, the global leader in nanobubble technology. Plants irrigated with Moleaer's nanobubbles had:

- More efficient nutrient uptake and water usage
- Improved capillary root development
- Increased resilience to high heat
- Reduced Pythium levels of up to 80%

The study also showed plants irrigated with Moleaer nanobubble enriched water produced a 9% increase in fruit weight without sacrificing nutrient content or BRIX value (grams of sucrose).

Moleaer delivers these results by providing a consistent flow of nanobubbles to the plant's roots to maintain high oxygen levels in irrigation water and deep water culture (DWC) systems. Increased root zone oxygenation through nanobubbles increases plant nutrient uptake. The outcome is healthier, more resilient plants, increased crop yields, and decreased time to cultivation.

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Research progress of novel bio-based plasticizers and their applications in poly(vinyl chloride)

Plasticized polyvinyl chloride (PVC) has been widely used in the world. Petroleum-based plasticizers especially phthalates have been the most common plasticizers used in PVC. However, the global petroleum resources are becoming scarce gradually, and the hygienic requirements for plasticizers are increasing. Owing to the negative impact of petroleum-based plasticizers on human health and the environment, their use has been restricted in the USA, the European and so on.

Biomass renewable resources have wide range of sources and low prices, and the chemicals obtained from them have various structures, which can provide a huge platform to design novel PVC plasticizers with the aim of replacing traditional phthalate plasticizers. Many bio-based PVC plasticizers, such as vegetable oil-based plasticizers, cardanol-based plasticizers, lactic acid-based plasticizers, waste cooking oil-based plasticizers, polyester plasticizers, hyperbranched plasticizers and so on, have been extensively studied.

We have reviewed recent research progress on different types of novel bio-based PVC plasticizers and assorted them by raw materials and chemical structure.

Click here for more information.

Polymers

TreeToTextile builds demonstration plant for upscaling new sustainable textile fibre

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TreeToTextile, owned by H&M Group, Inter IKEA Group, Stora Enso, and LSCS Invest, is investing €35 million to construct a demonstration plant in Sweden. It is a critical next step towards commercializing a new sustainable textile fibre, with scalable technology and low manufacturing cost. The aim is to make sustainable textile fibres available to all.

All over the world, sustainable textile fibres are in growing demand. TreeToTextile is committed to enabling brands, companies, and others with a progressive agenda, to have access to sustainable textile fibres. TreeToTextile offers a new technology to produce biobased textile fibres with a low environmental footprint at an attractive cost level. The new fibre is a regenerated cellulosic fibre, produced from renewable and sustainably sourced raw materials from the forest.

Click here for more information.

Braskem invests US$61 million to increase biopolymer production

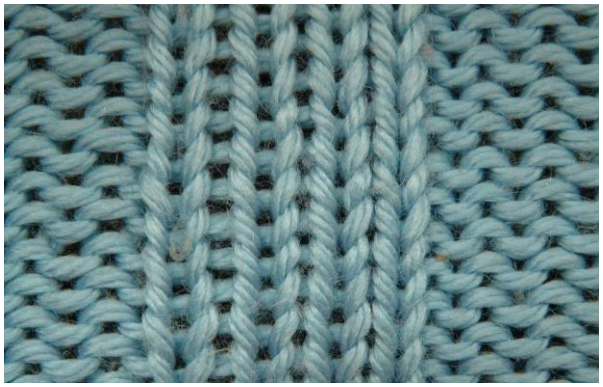
Braskem is expanding its production capacity of green ethylene, the main feedstock derived from sugarcane ethanol which is used in the production of renewable resins. These materials can therefore claim to capture CO_2, a greenhouse gas.

This raw material is produced at the company's plant in Triunfo, Rio Grande do Sul, whose capacity will be increased from the current 200 kton/year to 260 kton/year. The expansion project, budgeted at US$61 million, will be rolled out in 2021 and should be concluded in the fourth quarter of 2022.

Click here for more information.

Chemicals

Phytic acid: A bio-based flame retardant for cotton and wool fabrics



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Phytic acid (PA) is one of the widely used flame retardants (FRs) to treat a variety of fabrics owing to its high phosphorus content of ca. 28 wt%, abundance, non-toxicity, and biocompatibility.

The current review discusses the state-of-the-art of PA-based FRs for natural fabrics such as cotton and wool. The possibilities of making PA and FR-based multi-functional cotton fabrics having antimicrobial, conductive, hydrophobic properties are reported by virtue of the synergistic benefits associated with chitosan, silicon, nitrogen, and boron-based molecules. The factors influencing the FR behaviour as well as the durability of PA-based cotton and wool fabrics are discussed with respect to the concentration of PA, pH of the coating solution, temperature, and preparation methods.

Click here for more information.

Recent developments in fungal cellulase production and their industrial applications

The enzyme cellulase is a consortium of three enzymes- exo-glucanase, endo-glucanse and β-glucosidase, which can be produced by various microorganisms naturally and is ecologically important as it recycle cellulose in biosphere. Cellulase is a potential candidate in numerous industries as textile, detergent, pulp and paper, bioactive compounds, food, animal feed, biofuel, etc. Due to its immense applications in different fields, cellulase is intensively researched by both academics and industries. The driving force behind the research on cellulase is its commercial potential and enormous applications in various industries.

The objective of this article is to discuss fungal cellulase complex, production, and industrial application. Consideration is also given to recent production processes as submerged and solid state fermentation including different types of reactors used for cellulase production. The strategies for cost reduction and hyper cellulase production like mixed culture and genetic manipulation are also discussed along with global players of cellulase producers/suppliers.

Click here for more information.

A review on sources and extraction of phenolic compounds as precursors for bio-based phenolic resins

Residues from biomass processing/harvesting (e.g., straw, saw chips, bark) contain value-added chemicals for multiple applications. Biomass residues can be converted to chemicals and fuels, unlike other renewable sources such as wind and hydro, with the added benefit of reducing economic and environmental costs associated with residue disposal. Pyrolysis, the thermal degradation of the biomass, can convert these low-value residues to high-value energy or chemicals. The pyrolysis oils derived from lignocellulosic biomass are of particular interest as potential sources of bio-phenols.

This review is focused on the extraction and recovery of phenolic compounds from bio-oil produced during the pyrolysis of various biomass residues with a particular focus on the potential of hemp residues (hurds and straw) as a source of phenolic compounds. Considerable progress has been made toward producing cost-effective renewable phenolic resins. New and advance technologies and materials are being used for the production of bio-based resins. However, further investigation is required on the optimization of pre-treatment, extraction, and analytical techniques to meet the challenges of satisfactory quality and low cost of renewable resins.

Click here for more information.

Biosynthetic Technologies' Estolide technology finds new use in diabetic testing applications

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Biosynthetic® Technologies has announced that its Estolide technology has found a new use in diabetic testing applications. In partnership with Cayman Chemical, Biosynthetic Technologies, provides discovery and pre-clinical development services to the global pharmaceutical, biotechnology, and academic research markets using Estolide products (also known as fatty acid hydroxy fatty acids or FAHFAs) for research purposes.

Biosynthetic Technologies developed a novel class of high-performance, bio-based base oils with a wide range of uses. These patented Estolides are biodegradable, non-bioaccumulative, and non-toxic. In addition to industrial products such as lubricants and additives, Estolides have potential applications in the pharmaceutical sector. In addition to their potential use as an active pharmaceutical ingredient, some Estolides exhibit physical properties that may make them particularly suitable as an additive in certain pharmaceutical formulations.

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Consumer Products

SYNLawn® Unveils New and Enhanced Artificial Turf Products for New Year

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SYNLawn®, the largest manufacturer and unrivaled innovator of artificial grass in North America, announced its latest product enhancements and new offerings debuting in early 2021. Products now include more soy content, advanced drainage, additional color options and Super Yarn™ technology. SYNLawn will soon have five new additions that have earned Certified Biobased Product labels from the U.S. Department of Agriculture (USDA).

Click here for more information.

Forest Green Rovers to wear shirts made of coffee waste

Forest Green Rovers recognised by FIFA as the "world's greenest football club" has unveiled its latest efforts to transform the beautiful game - by revealing a prototype kit from made from waste coffee grounds and recycled plastic.

The club, which went climate neutral in 2017 with the United Nations, has been working with its kit partner PlayerLayer to investigate new fabrics since unveiling the world's first bamboo kit almost two years ago.

The coffee-based fabric has been top performer in initial tests and has been found to be lighter, breathable and more durable than its current Bamboo kit. To properly put it through its paces, the club's first-team is playing in a prototype coffee kit this Saturday, 27th February when they play Colchester at the Innocent New Lawn.

Click here for more information.

One and Only eco-Friendly diaper brand unveils 1-for-1 charity model, Believe Diapers

Believe Diapers, the first socially responsible and eco-friendly diaper brand with a true 1-for-1 charitable model, has launched to U.S. consumers. Born of the insight that one in three U.S. families struggles to afford diapers, philanthropy is at the Brand's core. Diaper need has a negative ripple effect, impacting an entire family's ability to work and attend school. To help address the shortage, Believe Diapers has pledged to donate one million diapers to U.S. families in need at launch, in addition to their 1-for-1 diaper matching donations. Believe Diapers will partner with Good+Foundation to facilitate all diaper donations.

Designed to be good for babies and also good for the planet, Believe Diapers are made with bamboo, a renewable resource that is also hypoallergenic, antimicrobial and odor resistant. These super soft, absorbent bamboo diapers are also free of all harmful chemicals, preservatives and additives.

Click here for more information.

UGG debuts Plant Power, a collection made with carbon-neutral, plant-based materials

Southern California-based global lifestyle brand UGG® (a division of Deckers Brands recognizes the importance of protecting the planet for future generations. Building on FEEL GOOD., the brand's sustainability platform launched in October 2020 to articulate its long-term goals and commitment to people and the planet.

To commemorate this important program, UGG® proudly introduces the dual-gender Plant Power Collection. Addressing the issue of carbon emissions, a key driver of global warming that threatens our oceans, atmosphere, and overall way of life, the collection features three footwear styles thoughtfully crafted with carbon-neutral, plant-based materials.

Click here for more information.

Nestlé launches bio-based lids and scoops made from renewable resource as part of net-zero commitment

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Nestlé has announced that it will introduce bio-based lids and scoops made from sugar cane and its by-product for a range of its nutrition products for babies and children.

The main advantage of these bio-based plastics is that they are made from a renewable plant material that can be continually replenished and that absorbs carbon dioxide from the atmosphere. In addition, this packaging helps Nestlé reduce its use of fossil-based plastics as part of its ambition to halve its emissions by 2030 and achieve net zero by 2050.

In the UK and Ireland, SMA Nutrition and Nestlé Health Science are rolling out the new bio-based packaging materials for scoops and lids on tins.

Click here for more information.

Patents

Novel bio-based diols from sustainable raw materials, uses thereof to make diglycidyl ethers, and their coatings

The invention relates to diols derived from 5-hydroxymethyl furfural, diformyl furan, or derivatives thereof. The invention further relates to diglycidyl ethers derived from the diols of the invention, curable coating compositions containing the diglycidyl ethers, and objects coated with the curable coating compositions. The invention also relates to composites, composites, adhesives, and films containing the diglycidyl ethers of the invention. The invention also relates to methods of making the diols, diglycidyl ethers, and curable coating compositions.

Click here for more information.

Events

Renewable Materials Conference
Cologne, 18th-20th May 2021

There is a growing market demand for advanced and ready-to-use sustainable material solutions with a low carbon footprint – and fossil-free. As a response to this challenge, nova-Institute has decided to unite all relevant industries in the new Renewable Materials Conference (RMC).

Over three days, participants get a complete overview of the latest renewable material solutions from a wide range of sustainable raw materials and technologies.

Click here for more information.

RRB 2021
Aveiro, 6th-8th September 2021

Delegates from university, industry, governmental and non-governmental organizations and venture capital providers will present their views on industrial biotechnology, sustainable chemistry and agricultural policy related to the use of renewable raw materials for non-food applications and energy supply. The conference further aims at providing an overview of the scientific, technical, economic, environmental and social issues of renewable resources and biorefineries in order to give an impetus to the biobased economy and to present new developments in this area.

Click here for more information.

EFIB 2021
Vienna, 6th-7th October 2021

Europe's Leading Event on Industrial Biotechnology and the Bioeconomy where delegates are provided with an update on the status and outlook of biobased industries. EFIB is proud to foster engagement between policy makers, a broad range of stakeholders connected with the existing biobased value chain and seeks to reach out to, and include, new interlocutors.

Click here for more information.

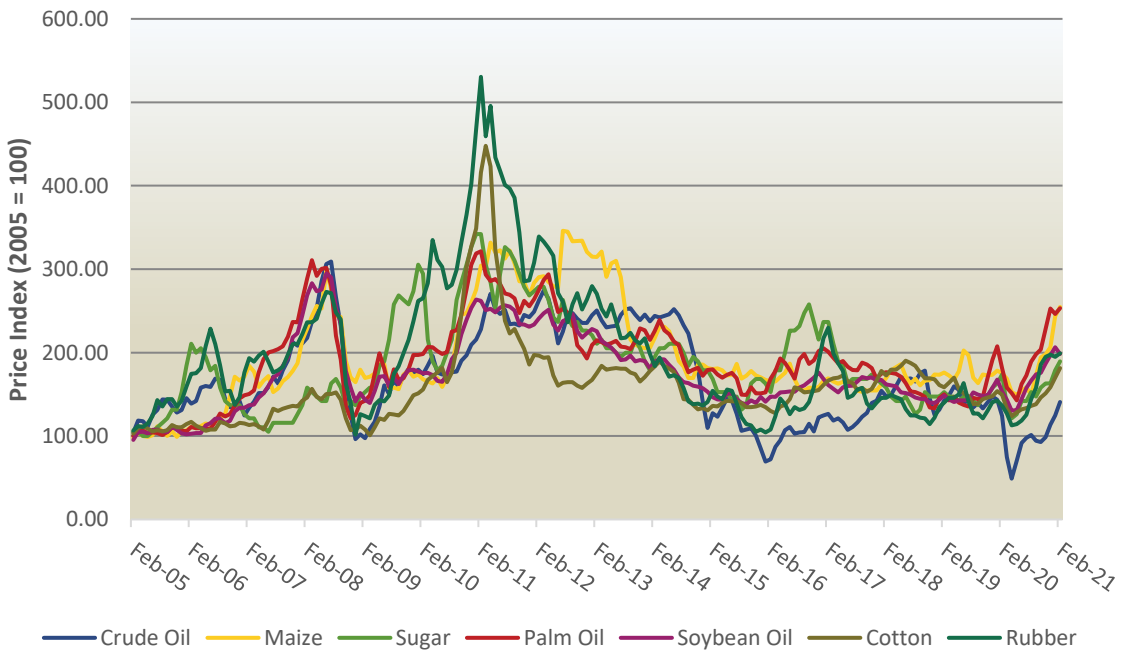
Price Information

Spot Prices of feedstocks as of today and five years ago, and percentile price change. Arrows indicate rise (↑), constant (–) or fall (↓) from previous month.

Item	Price, US$ (Feb 21)	Price, US$ (Feb 16)	Price Change
Crude oil (petroleum, barrel)	60.46 (↑)	31.03 (↑)	95%
Maize (corn, metric ton)	245.24 (↑)	159.68 (↓)	54%
Sugar (pound)	0.36 (↑)	0.29 (↓)	24%
Palm oil (metric ton)	1,017.33 (↑)	679.17 (↑)	50%
Soybean oil (metric ton)	1,032.67 (↓)	767.24 (↑)	35%
Cotton (kilogram)	2.05 (↑)	2.05 (↑)	39%
Rubber (kilogram)	2.35 (↑)	2.35 (↑)	85%

For details on indexes please see www.indexmundi.com/commodities

Raw materials 16-year Price Indices



For details on the nature of these commodities please see www.indexmundi.com/commodities

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