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

News Review

Bio-based Products

Issue Seventy-Nine

October 2018

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

Contents

Foreword

Welcome, all readers, to October's Free edition of NNFCC's Biobased Products News Review.

We begin, as we so often do, with a story that will hopefully help to boost the profile of biobased products here in the UK, as biobased products have finally found their way right to the "top", so to speak. It has been announced that the UK's parliament buildings will begin using disposable items made from biobased compostable plastics, to replace the plastics used up to now. The items include cutlery, coffee cups, and various items of food packaging, provided by UK-based company Vegware. Specific recycling bins will be used to collect the items, which will then be composted on-site. This means that those responsible for setting any future bioeconomy policy in the UK will be able to experience the benefits of compostable products first-hand, but will also set an example to consumers across the UK that there are sustainable alternatives provided by the bioeconomy.

Another such example of this is high-end supermarket Waitrose, which has become the first supermarket to introduce plastic-free alternatives to food packaging, selling Bee's Wrap reusable food wraps. These wraps, made from cloth treated with plant resins and beeswax, provide a sustainable alternative to plastic wrappings such as clingfilm and plastic sandwich bags. Too often in bioeconomy we focus on biobased and renewable alternatives to plastics and petrochemicals, but these wraps demonstrate that other approaches are possible. This announcement comes alongside more news from Waitrose, that they will also be phasing out disposable plastic bags entirely from their stores, replacing them with compostable alternatives.

However, the introduction of compostable and biodegradable plastics is not without its risks: biodegradation is a highly variable material property. The most important aspects are the environment in which degradation occurs, and the rate at which it occurs. Compostable packaging is designed for disposal through composting facilities and has to meet specific degradation standards, such as EN13432. Thus, the public must be made properly aware of these aspects, or the benefit of this technology will be lost. Given this variability, biodegradation claims need to be specific and clear. One such company to fall foul of this mistake has been Ancol Pet Products, who have become the first company to have their use of the term "biodegradable" be deemed misleading by the Advertising Standards Agency. Due to the lack of an indication of the required conditions for the biodegradation, ASA felt that the public would believe the plastic in the pet waste bags would decompose on a small time-scale in natural conditions, which is not the case. This landmark ruling highlights the importance of proper communication between the marketers of biobased products and their consumers, in order for the public to maximally benefit from biobased products.

Read on for the latest news.

Policy

First advertising standards ruling against term "biodegradable"

In what is believed to be a landmark ruling for the UK, the ASA has determined that the use of the term 'biodegradable' as used by Ancol Pet Products for their Refill Poop Bag Rolls "is misleading and had not been substantiated".

Whilst the specific ruling applies to plastics made with oxo degradable additives, it determines that the ASA "considered that consumers would understand the term 'biodegradable' to mean the capability of a product to disintegrate and decompose safely and relatively quickly in the open environment, leaving nothing behind."

Further, the ASA consulted Defra, which in this case stated that the length of time for biodegradation to commence would be from two to five years and that this "was not in line with how consumers were likely to interpret the term 'biodegradable'."

BBIA always maintained that to use the definition 'biodegradable' there has to be a time and place within which this occurs. These are determined by international standards. For packaging these are the BS EN13432 and for plastics BS EN14995.

Producers of plastic packaging claiming biodegradability that do not adhere to these international standards are now forewarned.

Click here for more information.

European Parliament reports on benefits of biobased plastics

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The European Parliament's report on the European Strategy for Plastics adopted by the plenary testifies to the increasing acknowledgement and endorsement of the value propositions of bioplastics. The report highlights the potential role of bio-based plastics and of biodegradable plastics in establishing a strong circular EU bioeconomy.

Bioplastics offer two paradigmatic developments at opposite ends of products' life cycles. On the one hand, bio-based plastics enable feedstock diversification and the gradual transition away from fossil and towards renewable feedstocks. This is an essential value proposition in the EU's bid to gain independence from fossil resource imports and to significantly reduce CO_2 emissions.

The other key innovation proposed by the bioplastics industry is biodegradability and compostability according to existing harmonized standard on industrial composting (EN 13432), that is, the conversion of plastic materials to water, biomass, and CO_2 through microbial metabolisation. Applied to food contact applications such as biowaste collection bags or food packaging, biodegradability and

compostability enables the optimisation of separate bio-waste collection for organic recycling, thus preserving valuable secondary resources and establishing an important aspect of the circular economy. In other environments, biodegradability can help to reduce plastic waste accumulation, for example in modern agriculture through the use of mulch films that are biodegradable in soil according to the standard EN 17033. In addition to this, there could also be selected future applications in marine contexts where items such as fishing gear are prone to being lost at sea unintentionally.

Click here for more information.

Report into most common marine litter items in Europe

Flickr

Reducing litter in the coastal and marine environment is a major and prior challenge to preserve biota, ecosystems, as well as goods and services that humans derive from seas and oceans. The identification of the most abundant beach litter items, the so-called Top Marine Litter Items, is a matter of concern for the MSFD, the upcoming EU Plastics Strategy and in general for the prioritisation of measures against marine litter.

Based on a compiled beach litter data set from 2016, most abundant items on EU beaches have been identified. The quantification of items through beach litter monitoring enables a ranking of items based on their numerical abundance. While a few studies from Regional Sea Conventions (RSCs), Non-Governmental Organizations (NGOs) and research projects have ranked items by their occurrence on beaches at different spatial scales, there was no EU wide analysis available.

Data is based on 1-year sampling (2016) and included the outcome from monitoring programs, clean-up campaigns and research projects. Results, also with focus on single use products, have been provided in support to the development of the EU Plastics Strategy. The data analysis involved spatial-temporal data grouping at European, regional and national level, including also seasonal variability of beach litter.

A total of 355671 marine litter items have been recorded during 679 surveys on 276 European beaches. Furthermore, the report gives a brief outlook on the potential consideration of risk-related item properties, leading to a prioritization based on potential harm. The report should provide information in order to develop and implement most efficient measures against marine litter.

Click here for more information.

Position paper on recycling of biobased plastics

Bioplastics are considered a sustainable alternative to plastics made from petroleum. Should these materials be used more frequently, for instance in packaging? The environmentally friendly potential of bioplastics will only be fully realized when it is also possible to recycle them. The experts at Fraunhofer UMSICHT wondered: Are bioplastics compatible with recycling? Their answers can be found in the new position paper, “Recycling Bioplastics.”

Click here for more information.

Research & Development

PepsiCo joins sustainable plastic bottle consortium

The NaturALL Bottle Alliance is a research consortium formed in 2017 by Danone, Nestlé Waters and bio-based materials development company Origin Materials to accelerate the development of innovative packaging solutions made with 100% sustainable and renewable resources. It has announced that PepsiCo, Inc. has joined the Alliance to advance the shared goal of creating beverage containers with a significantly reduced carbon footprint.

The Alliance also provided a progress report in its goal of developing and launching a PET plastic bottle made from bio-based material. Launched in March 2017, the Alliance uses biomass feedstocks, such as previously used cardboard and sawdust, so it does not divert resources or land from food production for human or animal consumption. The technology being explored by the Alliance represents a scientific breakthrough for the sector, and the Alliance aims to make it available to the entire food and beverage industry.

Click here for more information.

Public Domain Pictures

Elastomer applications of "biobased oil"

Bio-based oil is an emerging oil source to replace petroleum oil products in elastomers as a plasticizer. It is renewable, low cost, and has many advantages over conventional petroleum plasticizers. Bio-based oil usually contains multiple functional groups and can be treated, modified, or polymerized for different applications. In this article, a brief overview of bio-based oil and such replacement is provided. An example of modified soybean oil used in carbon black–filled SBR compounds is discussed to show the change brought about by the use of bio-based oils.

Click here for more information.

Methane-to-protein plant nears commission

Unibio and its partner and licensee Protelux are about to take a great leap forward producing alternative proteins from bacteria using methane as feedstock. During July Protelux completed the construction of the plant located in Russia and the parties are currently testing the plant and expect to commission it by late 2018.

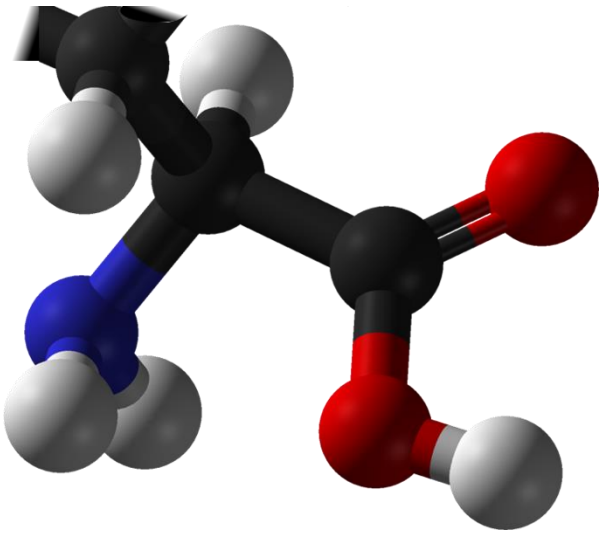
In May 2016 Unibio signed a license agreement with the intent to upscale and commercialize the Unibio U-loop technology in Russia allowing the conversion of methane into protein. Russia was chosen as an ideal site for such product as bacterial protein is historically known in the Russian market, as Russia has a well-developed compound feed industry, and there is access to an abundance of cheap natural gas. Now, a little more than two years after dry ink on the contract, the first plant is ready for testing and commissioning.

This is just the beginning as the licensee has already reserved land for the future expansion. The land is situated in an industrial zone holding various international companies and where a lot of the necessary infrastructure is already present to support the project.

The plant has a production capacity of approximately 6,000 TPA It is the first out of many plants to be constructed in the near future as the parties expect a rapid capacity increase to 100,000+ TPA.

Click here for more information.

Catalytic process for biobased amino acids



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Today, amino acids are primarily manufactured via microbial cultivation processes, which are costly, are time consuming, and require extensive separations processes.

As an alternative, chemocatalytic approaches to produce amino acids from renewable feedstocks such as bio-based sugars could offer a rapid and potentially more efficient means of amino acid synthesis, but efforts to date have been limited by the development of facile chemistry and associated catalyst materials to selectively produce α-amino acids.

In this work, various α-amino acids, including alanine, leucine, aspartic acid, and phenylalanine, were obtained from both biomass-derived α-hydroxyl acids and glucose. The route bridges plant-based biomass and proteinogenic α-amino acids, offering a chemical approach that is potentially superior to microbial cultivation processes.

Here, the authors report a heterogeneous catalyst that directly transforms lignocellulosic biomass-derived α-hydroxyl acids into α-amino acids, including alanine, leucine, valine, aspartic acid, and phenylalanine in high yields. The reaction follows

a dehydrogenation-reductive amination pathway, with dehydrogenation as the rate-determining step. Ruthenium nanoparticles supported on carbon nanotubes (Ru/CNT) exhibit exceptional efficiency compared with catalysts based on other metals, due to the unique, reversible enhancement effect of NH3 on Ru in dehydrogenation. Based on the catalytic system, a two-step chemical process was designed to convert glucose into alanine in 43% yield, comparable with the well-established microbial cultivation process, and therefore, the present strategy enables a route for the production of amino acids from renewable feedstocks.

Click here for more information.

Advances in biorefinery technology

The desire to have a more sustainable future, with lower emissions of carbon and sulphur to the atmosphere, a more appropriate reuse and valorisation of wastes, and less dependency on oil has motivated the society to develop processes where renewable biomass is used as a feedstock for the production of fuels, chemicals, energy and materials. In addition, a bio-based economy has also potential to generate new jobs and new opportunities for entrepreneurship, with further benefits to the society. In view of this, great efforts have been done in order to develop efficient, sustainable and cost competitive bio-based processes able to be implemented in industrial scale. Although important advances were achieved, and some processes are already available in a large scale, improvements are still needed to have a final product at a more competitive market price. In this sense, the strategy of integrating biorefineries to produce a variety of products from biomass has been considered as an important alternative to improve the financial performance. This paper highlights the most recent advances and opportunities in biomass conversion technologies and biorefineries for the development of a bio-based economy. Technological aspects including the hemicellulose integration and use of sugars for different products, lignin valorisation, development of efficient and low-cost pre-treatment technologies and development of highly efficient fermentation processes are also presented and discussed.

Click here for more information.

Polymers

DuPont's Sorona plant expands to meet demand

DuPont

DuPont Industrial Biosciences has completed the expansion of their Kinston, North Carolina, manufacturing facility that produces bio-based, high-performance DuPont™ Sorona® polymer. From the expansion, DuPont has increased the facility's capacity to produce Sorona® polymer by 25 percent. This investment is reflective of the growing demand for Sorona® polymer throughout the carpet and apparel markets and an emerging global focus on building the circular economy.

DuPont™ Sorona® polymer is made from 37 percent renewable plant-based ingredients and has many versatile applications. As compared to similar materials, like nylon 6, Sorona® polymer uses 30 percent less energy and releases 63 percent fewer greenhouse gas emissions. In addition to reducing its reliance on fossil fuels, Sorona® polymer combines eco-efficiency with

function, as its high-performance qualities can be used in a variety of applications. Fibres made with Sorona® polymer exhibit exceptional softness, inherent stain resistance and uncompromising durability, offering a sustainable, high-performing material option for customers throughout the supply chain.

DuPont Industrial Biosciences employs more than 90 workers in Kinston through the manufacturing of Sorona® polymer. With the startup of the line, four additional employees also are being recruited.

Click here for more information.

Spider Silk technology for plane materials

AMSilk

AMSilk, the world's first industrial supplier of synthetic silk biopolymers, has announced a partnership with Airbus, global leader in aeronautics, space and related services. The two companies have entered into a joint cooperation agreement to develop the new era of composites for use in the aerospace industry.

In recent years, the aerospace industry has shifted from metal and steel fuselage and wings to carbon fibre composite materials, primarily in an effort to decrease the plane's weight and save fuel over time. Airbus, committed to remaining at the forefront of aerospace innovation, is the first in the industry to experiment with this new material. It intends to explore how AMSilk's Biosteel fibre can allow them to approach the design and construction of their planes in an entirely new way.

The new composite material will be built using AMSilk's Biosteel fibre technology, which enables lightweight construction with multiple shock resistance and flexibility. As demand for air travel continues to increase, the need for larger, more flexible planes which spend less time in the shop and more time in the sky will continue to grow.

Biosteel fibre is made from a biopolymer based on natural spider silk, a material known for its strength, flexibility and toughness. AMSilk produces Biosteel fibre through a closed-loop biotechnological process that renders the product highly sustainable, with no petroleum inputs.

AMSilk and Airbus are aiming to launch a prototype composite material in 2019.

Click here for more information.

UK parliament adopts compostable plastics

The UK Parliament has announced the introduction of a new range of compostable products to replace existing single-use plastic items.

The plant-based products include certified compostable single-use cutlery, coffee cups and lids, soup containers, takeaway food containers, salad boxes, and drinking straws. New waste bins will be introduced to capture used compostable items, which will then be sent to a specialist waste facility. An in-vessel composting method will use a combination of heat and microbes to turn the waste into compost fit for any garden. Food waste

is already captured separately and sent to an anaerobic digestion facility to produce biofertilizer and methane gas for energy generation.

Compostable products are just one of several measures announced earlier this year with the ambitious aim of eliminating single-use avoidable plastics from both Houses by 2019.

From October 2018, Parliament will stop selling bottled water, immediately removing 120,000 plastic bottles from circulation annually. Plastic condiment sachets have also been identified as unnecessary and will be replaced with a sustainable alternative.

The new compostable products are provided by UK based company Vegware, through our supplier WK Thomas. The range is made from sustainably-sourced board, and biopolymers PLA and CPLA which are derived from plant starch.

The used disposables will be taken to the in-vessel composting facility by waste service provider Bywaters.

Click here for more information.

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Metsä plant to produce textile fibres from wood pulp

Metsä Group's innovation company Metsä Spring Ltd. and Japanese Itochu Corporation have established a joint venture, which invests approximately EUR 40 million in building and operating a test plant, with the aim to demonstrate a new technology for converting paper-grade pulp into textile fibres. Business Finland, a Finnish governmental funding agency, participates in the financing of the demo project with an R&D loan.

The textile fibre demo plant will be located next to Metsä Group's bioproduct mill in Äänekoski, Finland. Construction of the demo plant, with an annual capacity of about 500 tonnes, begins in October 2018 and it is planned to be started up in late 2019. The general engineering partner is Sweco.

The new technology to be studied and further developed in the demo project is based on direct dissolution using a novel solvent for the pulp dissolution stage. Metsä Group's wet paper-grade pulp will be used as the raw material. The new technology is estimated to be more environmentally-friendly than the textile fibre production technologies currently in use. The basis for the new technology has been developed in joint research programmes, starting in 2009. The main collaborators, in terms of development of the technology, include Aalto University, University of Helsinki, VTT Technical Research Centre of Finland and TITK from Germany. Metsä Group's own active development work started in 2012.

Click here for more information.

Chemicals

Novel Cyrene-based reactions

Dihydrolevoglucosenone (Cyrene®) has been successfully utilised as a bio-based platform molecule for the synthesis of pharmaceutically relevant intermediates through aldol condensation reactions. Utilising sustainable synthetic methodologies, the self-aldol condensation reaction of Cyrene was achieved in high purity, with isolated yields of 81.3%. Claisen–Schmidt reactions with a range of aromatic and heteroaromatic aldehydes yielded several previously unreported Cyrene-based compounds, characterised by single-crystal X-ray diffraction, FT-IR, NMR and MS.

Click here for more information.

Pilot plant for biobased platform chemicals opened

BioBTX B.V., a sustainable technology development company, has announced the official opening of the pilot plant for the production of sustainable platform chemicals in Groningen, the Netherlands.

BioBTX is developing a technology to convert non-food biomass and end-of-life feedstock materials into cornerstone aromatic chemicals, with a focus on Benzene, Toluene and Xylenes, which drop-in chemical intermediates are widely used for the production of plastics. By using renewable carbon sources, a significant contribution to the circular economy will be made, reducing the use of fossil feedstocks and lowering emission of greenhouse gases.

This pilot plant will initially convert non-food liquid biomass, like glycerol and fatty acids. In a second stage, the unit will be made suited to process solid biomass and end-of-life materials, like plastics and composites as well.

The pilot plant is located at Zernike Advance Processing site in Groningen the Netherlands, a semi-industrial environment with a focus on bio-based products, where knowledge institutions and businesses can take the important step from lab bench to medium scale production in green chemistry and biotechnology.

Earlier this year, the offices of BioBTX have moved to this site, thus facilitating optimal communication and operation.

Click here for more information.

Consumer Products

Biobased packaging for Only Natural Pet products

Braskem, the largest thermoplastics polyolefins producer in the Americas and the leading producer of biopolymers in the world, and Only Natural Pet, America's leading brand of natural pet supplies, together announced a new sustainable pet food packaging initiative utilizing Braskem's sugarcane based I'm green™ biopolymer. Only Natural Pet is integrating at least 30% bioplastic packaging material into every bag of its recently launched line of Mindful Meals dry dog food, directly supporting Only Natural Pet's ongoing commitments to environmental sustainability and carbon reduction.

Cultivation of sugarcane utilized in the production of I'm green™ PE captures carbon dioxide (CO_2)

and releases oxygen (O_2), which means Braskem's bioplastic has a negative carbon footprint. From a cradle-to-gate life-cycle perspective, every ton of I'm green™ PE used in the production of packaging equates to 3.09 tons of CO_2 captured from the atmosphere.

With 40 years of experience in as a recognized leader in flexible packaging solutions and process innovation, Peel Plastic has developed extensive knowhow into the unique packaging requirements and technologies of the pet food business. The Peel Plastics team worked side by side with Only Natural Pet and Braskem to design, develop and integrate the I'm green™ PE biopolymer into a new packaging solution that maintains all the performance characteristics required, while delivering a solution that is better for the earth.

Click here for more information.

Bio-On launches biobased fashion material sector

Bio-On

Bio-on, listed on the AIM segment of the Italian Stock Market - Borsa Italiana and operating in the sector of bioplastic of high quality, has presented the new business unit Fashion Development Material (FDM) specialized in the development of new high-tech materials for the fashion and luxury industry, based on Minerv PHA bioplastics, natural and 100% biodegradable. The goal is to identify processes, technologies and patents to produce fabrics, yarns, flexible surfaces, films, etc. made of bioplastic and designed to replace today's materials, many of which are synthetic and polluting.

The search for innovative and eco-sustainable materials, which respect the environment and people, is now a priority also in the luxury and fashion sector and today the creativity of the best designers is expressed also through the choice of natural and biodegradable materials.

The materials, which will be developed by a dedicated team, respond also to the need to reduce the pollution caused by the synthetic fibres that are used today by the fashion industry and that, invisibly, are released at each washing, ending up in the environment and seas. A dramatic situation similar to that caused by the plastic micro-beads used in cosmetics that pollute seas and rivers. In both cases Bio-on has developed innovative solutions starting from PHA bioplastics, which comes from a completely organic process and are 100% biodegradable.

All the Minerv PHA bioplastics (polyhydroxyalkanoates) developed by Bio-on are made from renewable plant sources with no competition with food supply chains. They guarantee the same thermo-mechanical properties as conventional plastics with the advantage of being 100% eco-sustainable and naturally biodegradable.

Click here for more information.

Europe's first biobased milk packaging

Max Pixel

The first bio-based milk can of Europe has appeared in the refrigeration at Albert Heijn. The can consists of 100% biobased PE from renewable material (sugar cane) instead of fossil raw materials. The bio-based content of the entire packaging, including the biobased cap and biobased sleeve, is added to approximately 98% by adding a number of essential additives. Biobased PE is not biodegradable, but it is very recyclable and, just as it is mentioned on the packaging, can be used with plastic waste. Private Label producer Farm Dairy is taking a big step in the further sustainability of dairy packaging. Albert Heijn was the first customer to make this step possible by introducing AH organic milk into 2L biobased cans.

The can has been developed in collaboration with Green PE supplier Braskem. Not only the can itself (own production Farm Dairy), but also the cap and the sleeve were developed especially for this introduction by Bericap and CCL respectively. The green cap makes the can extra eye-catching in the day-fresh milk shelf dominated by blue and white caps.

For Farm Dairy it concerns a double scoop. Not only the packaging is unique, but organic milk is a new milk flow at the Lelystad plant, where for the time being almost exclusively meadow milk is processed.

Click here for more information.

DuPont releases new stable enzymes for detergents

With the recent release of DuPont™ PREFERENZ® P 300, DuPont Industrial Biosciences (DuPont) takes its enzyme portfolio, including multiple PREFERENZ® products as well as EFFECTENZ® and REVITALENZ®, to the next level.

DuPont delivers enzymes that offer superior ability to remove tough stains for consumers with a wide range of cleaning challenges. The company's renewable, biodegradable enzymes can avoid harsher cleaning agents while maintaining superior performance, making sustainability as easy as doing the laundry.

From formulation to transportation, to retail to its final destination – the washing machine – DuPont's recently launched PREFERENZ® P 300 survives the challenges throughout the "Journey of the Detergent." By the time the detergent ends up in the home of the consumer and in the actual washing machine, this intrinsically stable enzyme is still active and will deliver a consistent cleaning performance. It does that without the need for a full stability system, meaning that there is potential for significant cost savings for detergent formulators. To learn more about the Journey of the Detergent, click here.

PREFERENZ® P 300 can help customers reduce their use of stabilizers, cut costs and improve sustainability, all without compromising on performance. A key strength of PREFERENZ® P 300 is its robustness. Structurally stable, this protease delivers reliable cleaning performance where it matters most to consumers – in the washing machine. PREFERENZ® P 300 has Cleangredients approval making it a market ready ingredient that can be used to formulate products targeted for EPA Safer Choice approval and eco-labelling in the U.S.

Click here for more information.

Waitrose first UK supermarket to sell plastic-free sandwich wraps

Waitrose & Partners will be selling paper food bags and reusable food wraps for sandwiches and snacks. The products are available in the majority of branches and offer an alternative to plastic sandwich bags and cling film.

The retailer is the first UK supermarket to sell Bee's Wrap reusable food wraps which are great for sandwiches, bread and cheese. Perfect for environmentally friendly lunchboxes, the wraps are organic cloth treated with beeswax, tree resin and organic jojoba oil which means they can be washed and reused for up to a year. They're an ideal natural alternative to plastic wrap.

These are complemented on shelf by greaseproof paper bags for snacks and sandwiches. The paper bags are Forest Stewardship Council certified, chlorine free and certified home compostable. Packaged in a cardboard box, the product contains 48 paper bags and are also microwave safe.

This is Waitrose & Partners' next step in bringing environmentally-friendly solutions to customers. The supermarket has recently announced it will remove 5p plastic bags by March 2019 and plastic bags for loose fruit and veg by spring 2019. The move will save 134 million plastic bags, the equivalent of 500 tonnes of plastic a year.

Click here for more information.

Waitrose commits to plastic bag phase-out

Photolib

Waitrose & Partners has announced that it has committed to removing loose fruit and vegetable plastic bags by spring 2019 and 5p single use plastic carrier bags by March 2019 next year in all shops. The move will save 134 million plastic bags, the equivalent of 500 tonnes of plastic a year.

The retailer will become the first nationwide supermarket to remove the fruit and vegetable plastic bags and introduce a home compostable alternative. This will be trialled first in a small number of shops at a date to be confirmed before being entirely replaced in all shops by spring next year.

The home compostable bags will look and feel similar to the current plastic ones, apart from printed text saying they are home compostable. The material will break down in landfill if put in a normal bin and the bags can be placed in food waste caddies or home composted.

Waitrose & Partners will initially remove 5p bags from six shops from 8th October to understand how to manage the changeover as smoothly as possible for customers before beginning a phased programme later in the year ahead of their complete removal in March 2019. Customers will be informed before the change comes into effect in their local shop.

Removing the bags from sale further underlines the supermarket's commitment to reducing its impact on the environment and its use of plastics and packaging. It has pledged not to sell any own label food in black plastic beyond 2019 - an earlier date than any other supermarket - and to make all own-label packaging widely recyclable (using the widely recycled logo), reusable, or home compostable by 2025.

Click here for more information.

Events

International conference on bioinspired and biobased chemistry & materials
Nice, 14th-17th October 2018

The scientific and international N.I.C.E (Nature Inspires Chemistry Engineers) Conferences are organized with the objective to share new developments in the growing field of bioinspired chemistry and materials and to understand new challenges that are being faced in this field of research.

The NICE conference encompasses chemistry, biology and physics and gives a multi-disciplinary overview of biomimetic approaches to engineering new materials and systems.

Click here for more information.

EFIB 2018
Toulouse, 16th-18th October 2018

Join over 650 bio-based leaders in 2018 for the 11th edition of EFIB in Toulouse, France, on the 16th, 17thand 18th of October.

Click here for more information.

International Conference on Green Chemistry and Technology
Edinburgh, 12th-13th November 2018

Green Chemistry and Technology 2018 is a global overview the Theme: "Endorsing the Importance of Sustainable World by Academic and Industrial Forum: Driving Waste towards Zero" is designed for professionals at all levels and career phases of the Chemical industry, Pharmaceutical industry and Petroleum industry, who want to improve their understanding of what will drive and shape the future of the market. This will include senior executives, sales and marketing personnel, strategic planners, who will be benefit from a broad overview of the Chemical, Pharmaceutical and petroleum industry. The strength of the Conference is that the participants tend to include all phases of the value chain as well as individuals from a wide variety of sector and countries. This experience helps the conference to be an interactive forum and encourages a strong level of dialogue and discussion, thus maximising the benefits of attendance. This conference surely provides better information and insight into the development of the world Chemical industry, which in turn has enabled attendees to make better and more profitable decisions.

Click here for more information.

BBIA Conference – Resource and Waste Management: A blueprint for a circular bioeconomy
London, 16th-18th October 2018

The one-day conference will address how climate change, soil and water quality, biodiversity loss, food production and waste, packaging and packaging waste, energy policies and health, are inextricably linked. In this complex nexus of policies, investments, consumer behaviour, industrial strategy and public health, we will also look at how innovation can improve life quality and provide a range of cross-sector solutions, whilst stimulating investments and employment in cutting edge industries in the UK. With this event, we aim to feed into policies on resources and waste, the bioeconomy, the 25 Year Environment Plan, the Industrial Strategy and the Clean Growth Strategy.

Click here for more information.

European Bioplastics Conference
Berlin, 4th-5th December 2018

The European Bioplastics Conference is the leading business and discussion forum for the bioplastics sector in Europe and worldwide. As the major industry association in this field, the hosts at European Bioplastics are committed to representing the interests of stakeholders along the entire value chain. With more and more brands and manufacturers waking up to the potential of bioplastics, and with policy makers increasingly streamlining their efforts to install frameworks that benefit the growth of sustainable bio-industries, this is the time to put bioplastics high up on the agenda of a bio-based circular economy in Europe and beyond.

Click here for more information.

IBioIC Annual Conference
Glasgow, 30th-31st January 2019

IBioIC's Annual Conference is the leading general IB conference in the UK. The conference celebrates the success of the biotechnology industry in Scotland and provides delegates with the networking opportunities needed to drive new collaborations.

Click here for more information.

World Bio Markets
Amsterdam, 1st-3rd April 2019

We are seeing a fundamental shift in the global bio-based chemicals market as brands take action to steer their supply chains away from a traditional petro-chemical base, and those who have already made the change enjoy the benefits both in public perception and commercial performance.

With this in mind, for 2019, World Bio Markets is truly connecting our producer and brand audiences to unite to achieve success.

Our exciting agenda helps bio-based producers to learn from each other, create greater efficiencies, improve their technology, scale-up and grow. At the same time, it connects them with brands.

Click here for more information.

RRB-15
Toulouse, 3rd-5th June 2019

Based on the previous RRB conferences, this conference is expected to welcome about 350 international participants from over 30 countries.

Delegates from university, industry, governmental and non-governmental organizations and venture capital providers will present their views on industrial biotechnology, sustainable (green) 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.

The three-day international conference will consist of plenary lectures, oral presentations, poster sessions and an exhibition. Companies and research organizations are offered the opportunity to organize a satellite symposium.

Click here for more information.

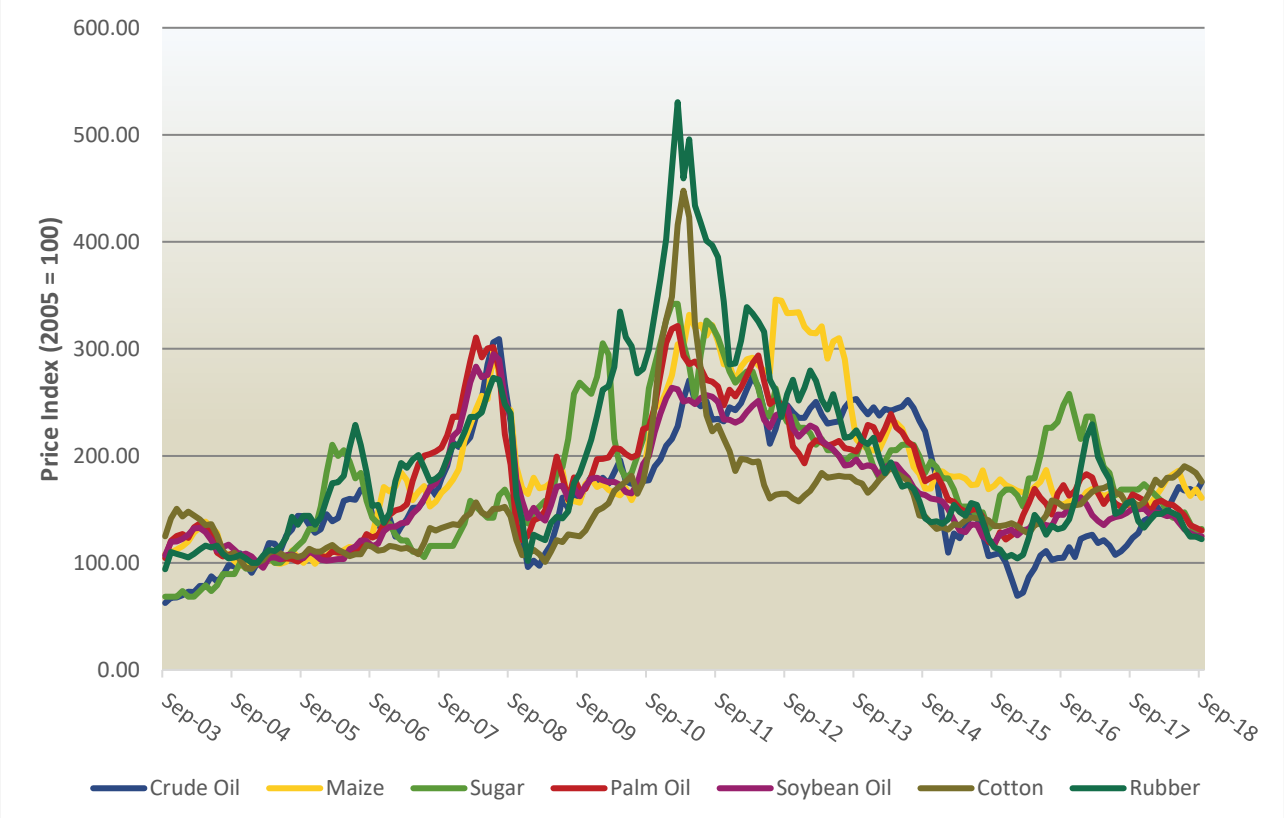
Price Information

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$ (May 13)	Price, US$ (Apr 18)	Price Change
Crude oil (petroleum, barrel)	105.43	75.36	-29%
Maize (corn, metric ton)	201.73	154.8	-23%
Sugar (pound)	0.41	0.25	-39%
Palm oil (metric ton)	859.00	523.62	-39%
Soybean oil (metric ton)	987.00	650.99	-34%
Cotton (kilogram)	1.97	1.99	+1%
Rubber (kilogram)	2.53	1.44	-43%

All prices from World Bank data.

Raw materials 15-year Price Indices



All prices from World Bank data, for details on index methodology, please contact NNFCC.

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