

TTO NEWS

Reducing single-use plastic by utilising food waste

TTO licensing agreements

Spin-off expands its product offering



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Department of Research and Innovation

Departement Navorsing en Innovasie
Kgoro ya Dinyakišišo le Tšweletšopele

Newsletter of the Technology Transfer
Office of the University of Pretoria

Issue 10 ■ July 2022

Letter from the editor



Despite the continued restrictions posed by the COVID-19 pandemic and subsequent nationwide lockdown, the Technology Transfer Office (TTO) managed to achieve its objectives of assisting researchers with their invention disclosures and filing patents. It also continued to raise awareness about technology transfer and the commercialisation of research.

One of the highlights of 2021 was the nomination of an invention born in the laboratories of the University's Department of Consumer and Food Sciences for the SAB Foundation's Social Innovation Awards. As a finalist in these awards, the research team received seed funding to the value of R200 000 to further develop this invention.

This year marked the 13th year of the TTO's existence. It celebrated this milestone with 16 invention disclosures and the filing of 36 patent applications. It also filed four PCT patent applications and three trademark applications, registered three trademarks in South Africa and signed three license agreements.

Activities to raise awareness about technology transfer and intellectual property among the University's staff and students included several workshops and meetings with researchers, as well as the annual World IP Day celebrations, which took place virtually.

We invite our researchers to contact the TTO for advice to turn their inventions into products that can be commercialised.

Adv Lawrence Baloyi
Head: Innovation and
Contract Management

Turning waste from fresh produce into biodegradable packaging and utensils

After seeing so much over-ripe fruit and vegetables go to waste that are no longer commercially viable, Dr Clarity Mapengo and Humbulani Nekhudzhiga, postgraduate students in the University of Pretoria's Department of Consumer and Food Sciences, decided to investigate whether there was a way to make use of this organic waste that did not add to the country's landfills.

Their invention, which they have patented and is being licensed under the name FruityXFusion, was nominated as a finalist in the SAB Foundation's Social Innovation Awards for 2001. These annual awards support innovations that solve social problems in a new and efficient way, while adopting a sustainable business model. They received seed funding to the value of R200 000 to develop their invention.

According to Dr Mapengo, this concept reduces the use of single-use plastics by creating biodegradable utensils and packaging material that can be used in the food industry.





“Our patented innovation uses heat processing, moulding and the drying of commercially rejected fresh produce composites into rapidly biodegradable utensils and packages. This includes, but is not limited to straws, cups and plates,” she explains.

The same production process is used for all these items. They only differ in their moulding shapes. “The fresh produce composites include other extracts that are readily accessible and relatively inexpensive to procure.

These extracts improve the mechanical strength and permeability of the final packaging material and utensils.”

Nekhudzhiga explains that the development team is currently busy perfecting the moulds that they are producing from the processed waste in order to develop a shape that is more appealing and useful to the consumer.

They hope to ultimately develop a viable product that can be tested around restaurants at the University. This will grant consumer validation and enable them to upscale production.

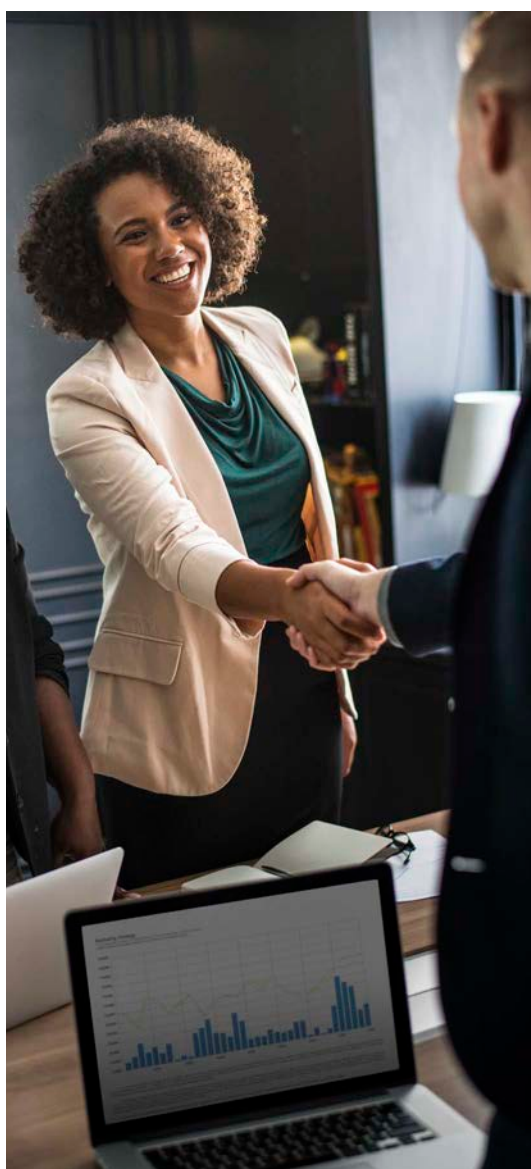
This innovation will intervene with the traditional fresh produce disposal pipeline at producer, processing and retailer level. The purpose is to add value to commercially rejected fresh produce waste, reducing the volume of waste in landfills. After use, these recycled products can be turned into compost or manure, which ultimately reduces the earth's carbon footprint.

This concept reduces the use of single-use plastics by creating biodegradable utensils and packaging material that can be used in the food industry.



Raising awareness about TT and IP at UP

The University of Pretoria (UP) strives to be a university that is known for its international competitiveness and local relevance through continuous innovation. The Technology Transfer Office (TTO) is committed to supporting UP's researchers by providing an enabling environment to further the utilisation of its research in the market by licensing and technology transfer (TT) or by establishing strategic industry partnerships.



THE TTO PROVIDES STAFF AND RESEARCH GROUPS AT UP WITH THE FOLLOWING SUPPORT:

- It coordinates processes, systems and structures to facilitate the transfer of UP-created discoveries into new products and services for public use and benefit, including invention disclosures, the evaluation and selection of intellectual property (IP) management, licensing and the provision of legal and financial support services for such activities.
- It provides support for legal, financial and project management services for IP activities, such as patenting and licensing.
- It facilitates the formation of "spin-off" companies by assisting with due diligence, financial and legal services, business plans and feasibility studies.
- It develops and implements commercialisation strategies.
- It provides commercialisation services that include identifying and securing initial seed funding, recruiting management teams and securing first-round venture funding.
- It ensures the effective management of the University's new-venture portfolio, thereby securing meaningful third-stream income.
- It develops marketing strategies for new inventions, including preparing marketing material, identifying and making contact with potential licensees and closing the deal.
- It selects the form of agreement, option, patent license, copyright license and materials license, and prepares ready-to-sign standard agreements.
- It monitors agreement and performance, maintains relationships, and attends to legal issues in the event of breach or non-performance.



UP LIBRARY NARRATIVE PRESENTATION

During 2021, the TTO Manager prepared a recorded narrative presentation on technology transfer, IP and commercialisation for postgraduate students. This 30-minute presentation was posted on the University's intranet. Whenever postgraduate students come up with inventions and are not sure where to go for assistance in terms of IP protection, how they will benefit if they disclose the IP to the TTO or need any other information on IP, they can now go to the intranet and get most of the answers they need. It can be viewed at:

<https://library.up.ac.za/c.php?g=1128848&p=8237870>



IP IN GENETICS WORKSHOP

On 17 June 2021, the TTO Manager gave a 40-minute virtual presentation on IP to 35 Genetics honours students. This was followed by a one-hour interactive session. A set of 20 questions was prepared that students were expected to answer. These included questions such as: Can a postgraduate student be a sole inventor at UP? What is the difference between a participant, an IP creator and a beneficiary? The workshop has been taking place since 2018.



LICENSING AGREEMENTS

Since the establishment of the TTO in 2009, the dominant route for the commercialisation of intellectual property at UP has been licensing. During 2020, the following three license agreements were signed:

- Letago Pharmaceuticals for the "Euclea Natalensis" patent (Prof Namrita Lall)
- Botanica Natural Products for the anti-acne pharmaceutical composition (Prof Namrita Lall)
- INSiAVA for research on aspects of hot carrier electroluminescent devices (Marius Goosen)

WORLD IP DAY 2021

Due to the COVID-19 pandemic, the TTO's World IP Day celebration took place virtually on 6 May 2021. In alignment with the theme, "IP and SMEs: Taking your ideas to the market", a sit-down was organised with HearX Group CEO, Nic Klopper. The HearX Group is the licensee for the mobile health hearing screening solution patent, which utilises pre-specified screening protocols on android software to assess hearing using automated sequences. Klopper inspired the attendees by sharing his experiences as an entrepreneur and how the invention reached the market. Ms Tshimangadzo Munyai, a representative of NIPMO, attended the virtual event.



Spin-off company expands its product offering

African Applied Chemical (AAC), a biotechnology company that was spun off the University of Pretoria, has made great progress in the four years following the licensing of its invention. The founder and CEO of the company, Dr Mthokozisi Sibanda, had co-invented a technology to reduce the rate of evaporation of expensive chemical compounds that act as insect repellents, thereby making them last longer. The company's flagship product is a hiking sock that has been treated with the long-lasting insect-repellent.

This invention was licensed to AAC in 2019. The company started shipping its first orders at the end of February 2020. However, with the announcement of a nationwide lockdown in March 2020 following the COVID-19 pandemic, tourism experienced a downturn. As visitors to the Kruger National Park were the company's primary target market, this had a devastating effect on its sales.

Although visitor numbers were limited when the park opened its gates to tourists again in September 2020, all AAC's product lines were sold out by the end of December 2020. This gave the company valuable sales data to test its sales assumptions. As the economy and travel starts to open up again, AAC launched an aggressive sales acceleration campaign and expects to be profitable during the 2022/23 financial year. It has also started exploring the regional export markets and will commence exports during 2022.

The company currently employs nine people full time and is on course to adding more jobs during the course of the year as sales accelerate.

As the sales of AAC's repellent product lines take off, the company's management has adopted a strategy of developing new applications of the technology to ensure a sustained increase in income. Two applications have been identified: second-generation long-lasting insecticide-treated mosquito nets for use against insecticide-resistant mosquitoes and slow-release pheromone traps for sustainable pest control in agriculture.



Long-lasting insect-repellent hiking sock: the flagship repellent textile product

LONG-LASTING INSECTICIDE-TREATED MOSQUITO NETS

The World Health Organisation (WHO) has put out a call to innovators for a mosquito net that contains a new active that has not been widely used in agriculture, in addition to the standard pyrethroid insecticide already approved to be used on long-lasting insecticidal nets.

AAC responded to this call. Its prototype long-lasting insecticidal nets are currently undergoing testing using WHO standards for the purpose of product registration. If successful, the registration will open up the US\$500 million per annum long-lasting insecticidal nets donor market to AAC.

The new long-lasting insecticidal nets utilise the proprietary Bi-Ko™ slow-release technique to deliver small quantities of piperonyl butoxide (PBO) mixed as a novel natural insecticide called nootkatone. PBO is a synergist chemical that prevents mosquitoes from resisting the effect of pyrethroid insecticides. Nootkatone is a food-flavouring agent usually found in minute quantities in the skin of grapefruit.

It is very toxic to insects such as mosquitoes. The safety of nootkatone to humans (it is edible) and the fact that it is not used in agriculture makes nootkatone an excellent insecticide for mosquito nets, alongside the tried and trusted pyrethroids insecticides. The aim is to have a dual-active mosquito net incorporating PBO and a novel natural insecticide to maximise the insecticide properties of the mosquito net against high-intensity insecticide-resistant mosquito species.

AAC's technology application in long-lasting insecticidal nets is state of the art in the market and will go a long way in addressing the problem of a rise in insecticide resistance, particularly in Africa, leading to an increase in deaths due to malaria. Initial laboratory efficacy tests are looking very good and testing continues.

The company is aiming to submit a registration dossier to the WHO by June 2022 and to fully participate in the supply of mosquito nets in 2024. The participation of AAC in the mosquito net market will be a significant event. This will make it the first African manufacturer to participate in the manufacture of mosquito nets, contributing to the growth of the South African textile industry. AAC's nootkatone supplier, Applied Protein Biotechnologies (APB), will also be able to mass produce nootkatone locally, paving the way for the widespread use of the product in insect repellents and insecticides for the local and export market.

The skin of grapefruit contains minute quantities of nootkatone. It is very toxic to insects such as mosquitoes.



SLOW-RELEASE PHEROMONE TRAPS FOR SUSTAINABLE AGRICULTURAL PEST CONTROL

The fruit-growing market is a vibrant sector of the economy, which exports a significant portion of its produce to Europe. However, this industry is facing a significant existential threat due to the banning of most synthetic insecticides by the European Union. The industry desperately needs to control fruit flies and other pests that are responsible for the spoilage of produce.

The European Union is strict and demands very high standards in controlling fruit flies at the source. With the banning of synthetic insecticides, only a few tools are available to control the fruit fly menace. However, advances in technology have given this industry some hope.

Pheromones are odours released by female pests to attract male pests. The male follows this plume of odour until it finds its soul mate. The ability to produce pheromones industrially has given rise to their use to attract and trap male pests. If sufficient numbers of males are trapped and killed, females

will not be able to produce fertilized eggs, leading to the collapse of the pest population without using any synthetic insecticides. Although this technology is applied in South Africa to control fruit flies, the pheromones are expensive (about R22 000 per kg).

AAC identified this gap in the market and entered into a strategic partnership with a major player in the industry to develop pheromone traps that incorporate the Bi-Ko™ slow-release technology in the manufacture of pheromone slow-release traps. AAC's slow-release technology will reduce the amount of pheromone required for their sustained release from traps in the field. The aim is to reduce the cost of the application by reducing the expensive pheromone needed for a season in the field. This cost saving will go directly to the farmer's bottom line.

AAC has completed the first prototypes of the slow-release articles. Field testing by the strategic partner will start soon.

Record-breaking funding from research contracts

During 2021, the Research Contracts office in the Department of Research and Innovation concluded a total of 362 research contracts amounting to just over R500 million, including 107 with the Faculty of Health Sciences (almost R300 million) and 142 with the Faculty of Natural and Agricultural Sciences (just over R143 million). The value of these signed agreements is the highest that has ever been recorded at the University of Pretoria.

The responsibilities of this office include the negotiation, vetting, approval of research-related agreements and license agreements, and providing legal advice and opinion on research and intellectual property-related matters across all the University's faculties. It is also engaged in drafting research contracts, such as memoranda of agreement, memoranda of understanding, research collaboration, research funding, material transfer, clinical trials, service-level and license agreements.

DID YOU KNOW?

SUPERGLUE



Superglue was invented in 1942 when Dr Harry Coover from Kodak Laboratories was desperately trying to find an ultra-transparent type of plastic to use in precision gun sights. He then discovered cyanoacrylate. Unaware of the fact that he had just invented one of the most versatile types of glue ever, and frustrated by its fast action and extreme stickiness, he threw it away and carried on working. Only years later, during new research, he remembered the substance and realised its unique properties. Together with his team, he tried the glue out on all types of surfaces. Without fail, heating up or pressure, the result would be permanent adhesion. Although it was brought to the market in 1958 under the name Eastman 910, it became widely known as superglue.



THE MICROWAVE OVEN

The microwave oven was invented in 1945 as a result of a piece of chocolate! In 1942, Percy Spencer of the American company Raytheon walked past a radar unit, and the chocolate bar in his pocket transformed into a sticky mess. He immediately thought of the radiation of the microwave in the installation, and started to experiment with different food items. He found that microwaves are able to actuate the water molecules in food to such an extent that they created warmth. Furthermore, they have the ability to heat substances quicker than the traditional oven. Raytheon's first commercial microwave, which was nearly 1.8 m in height and weighed 340 kg, took shape in 1947. It would take a further 20 years to develop a table-size model. Today, every new kitchen comes with a microwave as standard.