

◆ INFLUENCE- MAGAZINE

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V SPECIAL EDITION

SPECIAL EDITION

PHARMBIOTRAC

Bringing Natural Medicine to the World



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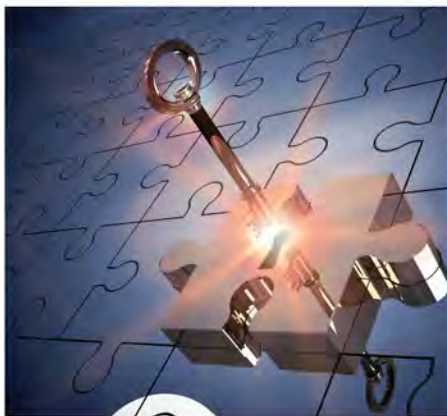
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From the Publisher

I am genuinely excited to introduce colleagues who are literally on the cusp of changing the planet. Medically, that is.

What do I mean? Specifically, the PHARMBIOTRAC team is hard at work identifying, growing, and processing the ancient secrets of traditional, plant-based medicine into dosage formulas. Really. They are converting pure formulas of plants to address uniformity in dosage. I traveled to Uganda to meet with the leadership to learn what they are producing that can benefit the world.

I was fortunate to meet them and Vice-Chancellor Professor Celestino Obua in Dallas, Texas, at the 2023 Uganda North American Association Conference. As I have been supporting children in rural areas in Uganda since 2018 and am working to bring a collaboration of services to the country, it only made sense to attend the annual conference—a very fortunate turn of events.

Because of my intent to visit distant rural villages throughout the country, we immediately made a notable connection—the PHARMBIOTRAC program of educating masters and Ph.D. -level scientists who would venture into rural communities to evaluate and perform medical tests for the disease and identify possible candidates to learn how to dispense these natural remedies in pill, capsule, or syrup forms. Imagine a world where even the most remote populations can receive medical treatment for some deadly diseases. Tremendous!

I ventured to Uganda during the months of December 2023 and January 2024. Me and my team from TAG 4 Change (a certified NGO in Uganda) had the pleasure of spending an entire day with the leadership of the program, visiting the specially formatted gardens (there is a section for each region of Uganda so specific plants and their variances to each other area). We toured the laboratories, witnessed several research activities, were lectured by team leadership, and enjoyed informal meetings with key personnel.

In addition to natural medicine, PHARMBIOTRAC is also working on a social-entrepreneurship incubation model. Interested and qualified citizens are encouraged to apply for acceptance into the program. If an innovative idea is scalable, it will qualify for initial funding, assistance with formulation, business planning, branding, marketing, and, ultimately, help in launching. Their relationship with PHARMBIOTRAC continues for as long as the business operates.

I encourage you to receive this organization, its leadership, and its mission by supporting the Friends of PHARMBIOTRAC Foundation to ensure the entire enterprise's success can continue to positively impact all of humanity with its innovative and much-needed endeavors. 🌱

For more information and to become a sponsor or donor, please go to:

<https://pharmbiotracfoundation.org/>



On The Cover

The PHARMBIOTRAC leadership team from Mbarara University of Science and Technology, from left to right: PROFESSOR DR. ROBERT TAMUKONG, ENGINEER ANKE WEISHEIT, DR. CASIM UMBA TOLO, and PROFESSOR PATRICK ENGEU OGWANG



PHARMBIOTRAC Program at Mbarara University of Science and Technology

The department's research focuses on the intersection of pharmaceutical biotechnology and traditional medicine, emphasizing bridging modern scientific practices with indigenous healing modalities. PHARMBIOTRAC aims to explore the potential of medicinal plants as a sustainable source of bioactive compounds for drug discovery and development.

Additionally, leadership is committed to leveraging biotechnological tools and techniques to enhance the efficacy, safety, and accessibility of traditional medicine. This includes exploring interdisciplinary approaches, such as molecular biology, pharmacogenomics, bioprocessing, and formulation science, to unlock the therapeutic potential of natural remedies.

The PHARMBIOTRAC program at MUST offers an opportunity to engage in dynamic research and collaboration within a dedicated academic environment. The program focuses on building specialized human resources that align with the applicant's career aspirations of becoming a leader in translational research and innovation in pharmaceutical biotechnology and traditional medicine.

Furthermore, the program's academic rigor, hands-on training, and industry partnerships provide a conducive environment for applicants to expand their expertise and contribute meaningfully to the field. The committed applicant can look forward to engaging with esteemed faculty mentors, collaborating with peers, and participating in experiential learning opportunities to further their professional development.

The PHARMBIOTRAC leadership's academic background, research expertise, global recognition, and commitment to excellence are unmatched. They are eager to contribute their skills and knowledge to the educational and scientific communities at MUST and significantly advance pharmaceutical biotechnology and traditional medicine. 🌱

General Information About PHARMBIOTRAC Project

The Eastern and Southern Africa Higher Education Centers of Excellence (ACE II) project supports the governments of eight participating countries—Ethiopia, Kenya, Malawi, Mozambique, Rwanda, Tanzania, Uganda, and Zambia—in strengthening the selected ACEs to deliver quality postgraduate education and build collaborative research capacity in the regional priority areas. In Uganda, the project is implemented by the MoES through Makerere University (MUK) with two centers, Uganda Martyrs University (UMU) and Mbarara University of Science and Technology (MUST).

The Project Development Objective

The Project Development Objective (PDO) is:

'To strengthen selected Eastern and Southern African higher education institutions to deliver quality postgraduate education and build collaborative research capacity in the region priority areas.'

Background

The Pharm-Biotechnology and Traditional Medicine Centre (PHARMBIOTRAC) is one of the 24 Eastern and Southern Africa Higher Education Centers of Excellence (ACE II) Program and was established at MUST in 2017 with financial support from the World Bank through the Government of Uganda and MUST. This initial support is considered as a seed fund, and PHARMBIOTRAC is expected to seek additional funding for sustainability.

PHARMBIOTRAC was established to address one of the critical development challenges facing Africa, i.e., low life expectancy and productivity compared to other continents, predominately due to a high burden of both communicable and non-communicable diseases. The center hopes to achieve this by using Africa's rich biodiversity that forms the continent's natural wealth through providing a regional platform for innovative drug development, including exploring the use of traditional medicine in the region.

Website:

<https://pharmbiotrac.must.ac.ug/>

PHARMBIOTRAC provides support to selected highly motivated, research-focused, and qualified candidates to pursue their M.Sc. and Ph.D. study programs, which aim to achieve the center's goal through the existing academic structures within MUST and departments that offer relevant PHARMBIOTRAC programs.

The goal of PHARMBIOTRAC is "to build a critical mass of specialized and skilled human resources that can advance traditional medicine and Pharm-Biotechnology for the socio-economic development of Africa."

Our Vision is "to be a leading African Center of Excellence for training and research in traditional medicine and pharm-biotechnology."

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General Information

Mission

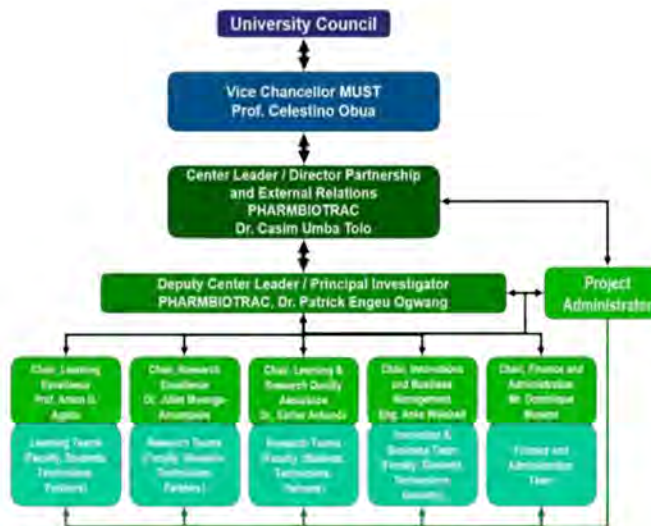
"to contribute to documentation, validation, and value chain development of traditional medicine and biotechnology products for use in pharmaceutical and nutraceuticals industries in the region through training, research, and community services for sustainable development."

Objectives

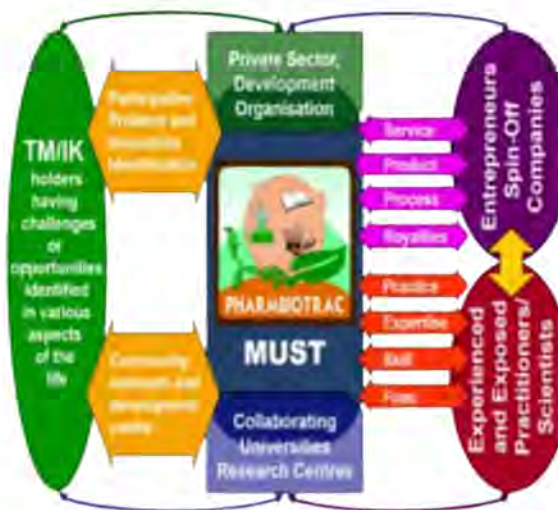
To build a critical mass of specialized and skilled human resources that can advance traditional medicine and Pharm-Biotechnology for the socio-economic development of Africa, and the specific objectives include the following:

- Strengthen capacity in the region to train highly skilled and specialized professionals in traditional medicine and Bio-pharmaceuticals
- Strengthen capacity in the region to engage in cutting-edge research in TM and systems biology for health product development
- Create capacity in collaboration with the private sector industry for the development, production, and commercialization of TM, biopharmaceuticals, and nutraceuticals from research outputs
- Advance the practices of TM/TMK and promote domestication and sustainable utilization of medicinal species

Governance Structure of PHARMBIOTRAC



PHARMBIOTRAC Framework



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Thematic Areas of Focus of PHARMBIOTRAC

- i.** Understanding Traditional Medicine Philosophy of Health and Disease Prevention and Control
- ii.** Traditional/Herbal Medicine Quality and Safety Standards
- iii.** Herbal Medicine Production/Manufacturing and Quality Control Standards
- iv.** Traditional/Herbal Medicine Knowledge and Material Conservation and Propagation - in-situ and ex-situ
- v.** Traditional/Herbal Medicine/ Clinical Validation Protocols and Standards
- vi.** Pharmaco-Biotechnology-Application of Biotechnology to Drug Discovery and Drug Production
- vii.** Pharmaceutical Business Management/Regulation



The main focus to achieving the center's objectives

- PHARMBIOTRAC provides support to selected highly motivated, research-focused, and qualified candidates to pursue their M.S.c and Ph.D. study programs aimed at achieving the goal of the Center through the existing academic structures within MUST and departments that offer PHARMBIOTRAC-relevant programs
- Some of the students receive direct scholarships from PHARMBIOTRAC (covering tuition, stipend, and research support) while others are either self-sponsored or by their governments/other organizations
- At least 20% of the total students are regional, and at least 20% are female, designed to comply with World Bank Disbursement Linked Indicator/Result (DLI/DLR) requirements
- A regional platform for innovations and value addition to the use of traditional medicine (mainly herbal products) in the region

Key academic programs supported by PHARMBIOTRAC

A: Ph.D. by Research (thematic areas above) - Duration 3 years

B: Current Masters programs offered (by course work and research) - Duration 2 years

1. Master of Science in Pharmacology (M.Pha)
2. Master of Science in Pharmacy (Clinical Pharmacy) (M.Sc Clinical Pharm.)
3. Master of Science in Pharmacognosy and Natural Medicine Science (M.Sc PNMS)
4. Master of Science in Pharmaceutical Analysis

C: Short Courses - Certificate of Production and Quality Assurance of Herbal Medicine

To date, PHARMBIOTRAC has achieved tremendous outputs, among which are the following:

- Trained and completed scores of Ph.D. and Masters across eleven African countries in critical thematic areas, among whom now occupy key positions of responsibility in their respective countries and capacities
- Achieved several community outreach and training activities, including medical camps, herbalists' training in critical and relevant areas of their practice
- Established an herbal garden for sustainable utilization, conservation and domestication of essential medicinal plants commonly used among rural communities
- Established modern research laboratories in biotechnology, natural product development, and pharmaceutical analysis
- Led research in natural product development and production, including innovation and incubation, with many prototypes developed

- Conducted staff and student exchanges with industry, universities, research institutions, both regionally and internationally, with close to 20 partner MOUs signed
- Achieved close to 200 peer-reviewed scientific publications in reputable international journals
- Established the Friends of PHARMBIOTRAC Foundation, incorporated in Uganda and in the USA, respectively as an NGO with the NGO Registration Bureau and as a 501c3 tax-exempt non-profit organization

WEBSITE: <https://pharmbiotracfoundation.org/>





Exploring the Frontiers of Natural Products Research by PHARMBIOTRAC at Mbarara University of Science and Technology

Introduction

Nestled within the vibrant academic landscape of Mbarara University of Science and Technology, the Pharm-Biotechnology and Traditional Medicine Centre, ACE II (PHARMBIOTRAC), stands as a beacon of innovation and excellence. At the crossroads of modern biotechnology and traditional medicine, this center has pioneered groundbreaking research to bridge the gap between ancient healing wisdom and cutting-edge pharmaceutical advancement.

Establishing a Nexus

PHARMBIOTRAC's mission explores the intricate connection between pharmaceuticals and traditional medicine, seeking to harness the synergies between these seemingly disparate realms. The researchers at the center believe that understanding and incorporating conventional healing practices into modern biotechnological frameworks can lead to novel therapeutic solutions with profound implications for global health.

Thematic Research Areas

a) Harvesting Hope: The Power of Indigenous Medicinal Plants

PHARMBIOTRAC has been at the forefront of isolating and characterizing bioactive compounds from indigenous medicinal plants. Researchers collaborate with traditional healers and local communities to identify potential drug candidates, paving the way for developing new pharmaceuticals. The team has meticulously identified and studied the active compounds, opening new possibilities for drug discovery. The synergy between modern analytical techniques and traditional knowledge painted a promising picture for the pharmaceutical industry.

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Field identification of medicinal plant sample collection and training on herbarium specimen preparation to a visiting intern students by Dr. Hilda Ikiriza in Kihumuro campus Mbarara University of Science and Technology

b) Reviving Ancient Wisdom: Significance of Ethnobotany, Ethnopharmacology and Medicinal Plant Conservation.

Recognizing the importance of preserving biodiversity, the center focuses on ethnopharmacological studies to document traditional medicinal knowledge. Simultaneously, initiatives are in place for sustainable harvesting and conservation of medicinal plants, ensuring the longevity of valuable natural resources. The researchers collaborate with local healers, preserving and documenting age-old healing practices. These studies shed light on the importance of cultural knowledge in developing practical and culturally sensitive healthcare solutions.

Leveraging state-of-the-art biotechnological tools, PHARMBIOTRAC conducts bioprospecting endeavors to unearth microbial and plant-derived compounds with therapeutic potential. This research avenue holds promise for discovering new antibiotics, antivirals, antimalarial, anticancer agents, etc.

Example: Scientists at PHARMBIOTRAC led by Dr. Hilda Ikiriza have identified *Dioscorea bulbifera*, commonly known as the air Potato, as a potential natural contraceptive for women.

Studies have revealed that *Dioscorea bulbifera* contains diosgenin, a compound with contraceptive effects. The plant's tubers have shown promise in regulating menstrual cycles and reducing the likelihood of conception without causing adverse side effects.

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Exploring Frontiers

The potential of *Dioscorea bulbifera* as a natural contraceptive has sparked excitement in the scientific community, as it could provide a safe and accessible alternative for women worldwide.

The potential of *Dioscorea bulbifera* is seen as a breakthrough in family planning and a sustainable, plant-based solution. As scientists continue their investigations, the hope is that *Dioscorea bulbifera* could become a valuable addition to the array of contraceptive options available to women, offering a natural alternative that aligns with global efforts toward sustainable and environmentally friendly solutions. Stay tuned for further updates on this promising development in women's healthcare.

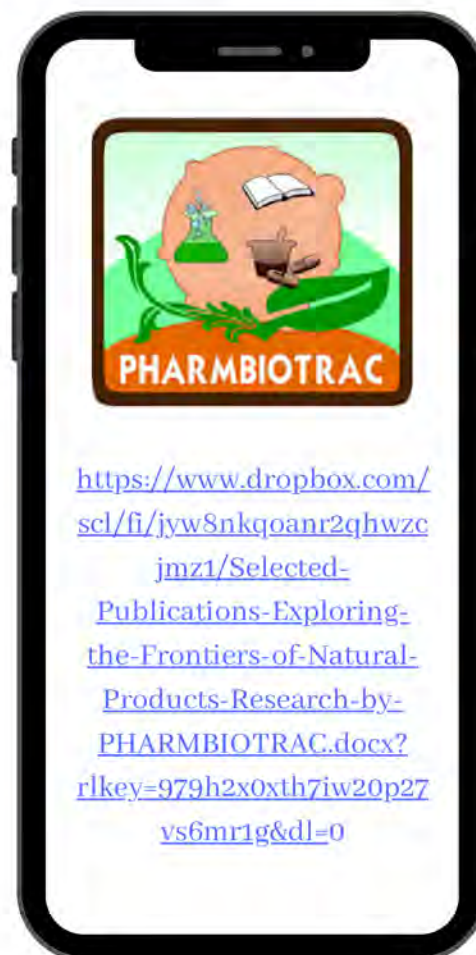
d) Integration of Traditional Medicine into Healthcare Systems

PHARMBIOTRAC recognizes the need for a holistic approach to healthcare. Researchers are actively engaged in projects that explore integrating traditional medicine into mainstream healthcare systems, fostering collaboration between traditional healers and modern medical practitioners.

(Link to Selected Publications Exploring the Frontiers of Natural Products Research within the image on the right).



Extraction of a herbal material to obtain active pharmaceutical ingredients





The PHARMBIOTRAC Product Development Officer Mr. Jimmy Angupale in the PHARMBIOTRAC production lab demonstrating to students of Mbarara University of Science and Technology, Uganda on how to cap syrup bottles using a semi-automated capping machine.





Dr. Casim Umba Tolo (Director, PHARMBIOTRAC) Presenting Tremendous Achievements of Results by PHARMBIOTRAC to the World Bank Group and African Regional Governments during the Eastern and Southern Africa Higher Education Centers of Excellence Project (ACE II) Midterm Technical and Advisory Meeting in Lilongwe, Malawi (November 18-19, 2019). 🌟

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Exploring Frontiers

Laboratory work by PHARMBIOTRAC at Mbarara University of Science and Technology

The center established and actively supports several laboratories at Mbarara University of Science and Technology (MUST). They include PHARMBIOTRAC production, pharmaceutical biotechnology and microbiology, pharmacology, and pharmaceutical analytical laboratories.

Due to the nature of programs offered at the center in the area of natural product development and standardization, several laboratory experiments are conducted in the labs, ranging from testing of drugs, biological assays, formulation of various products into tablets, syrups, etc., analysis and quality control of herbal medicines; plant tissue engineering and other biotechnological processes.

Therefore, several activities are implemented in these laboratories, as shown in the various pictorials. Our pool of postgraduate research works initiates some of these, but others stem from specific research projects on drug discovery and development. We also accumulate preclinical data in natural drug development from these laboratory experiments that inform subsequent decisions regarding the potential safety and effectiveness of medicinal products from plants and other natural sources.

Apart from research and product innovations, our laboratories also offer contract services to private industries or companies who need more capacity to carry out certain aspects of their manufacturing. For example, our analytical lab provides quality control services to several local industries producing phytopharmaceutical products. The production laboratory also offers contract manufacturing services to innovations and local herbal industries. These services are vital in supporting the private sector and contributing to Africa's socio-economic transformation.

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“*I have a tremendous amount of respect for the natural medicine that Mother Nature Provides.*”

---Robin S. Baker, Esotericism With an Unconventional Soul: Exploring Philosophy, Spirituality, Science, and Mysticism



Eng. Anke Weisheit (Chair, Innovation & Business Management, PHARMBIOTRAC) demonstrating sustainable harvesting techniques of medicinal plants during a training session of Herbalists in Kamwenge District, Uganda in April 2021.



Students performing the task of operating the capsule filling machine under the guidance of the Product Development Officer (Angupale Jimmy) at the PHARMBIOTRAC Production Laboratory, Mbarara University of Science and Technology (MUST).



*Sorting leaves of the *Veronia amygdalia*, a potent anti-malarial plant commonly used by local communities in Africa*



Eng. Anke Weisheit at the natural medicinal gardens examining specimens



Development of herbal capsule formulation using semi-automated equipment



Training Pharmaceutical Science students on how to use the bioreactor for cultivation of bacteria on a large scale for harvesting their useful secondary metabolites by Dr. Hilda at the PHARMBIOTRAC biotechnology lab at MUST



Dr. Ajayi Clement Olusoji (PHARMBIOTRAC Senior Research Fellow), imparting knowledge to MUST students. The laboratory in its state can develop and validate methods for natural product analysis and is a reputable laboratory where new and modified methods can be developed. In addition, newly developed drug characters are assessed in MUPCARL to establish how they behave as part of the assay required for their notification by the National Drug Authority.

Conclusion

The Pharm-Biotechnology and Traditional Medicine Center, ACE II, at Mbarara University of Science and Technology, stands as a testament to the transformative power of interdisciplinary research.

By blending the ancient wisdom of traditional medicine with the precision of biotechnology, PHARMBIOTRAC is contributing to a new era of healthcare innovation, promising a healthier and more harmonious future for communities in Uganda and beyond. 🌱

Extraction and Fractionation of Bioactive Compounds

The Mbarara University Pharmaceutical Chemistry/Analysis and Research Laboratory (MUPCARL) is a citadel of learning, skills acquisition, and drug analysis/development. The laboratory is capable of extracting molecules in their crude form from natural sources using various techniques, including the soxhlet extraction process, steam distillation, and ingestion, to mention a few. The state-of-the-art equipment is highly useful in concentrating the extracts to their respective powdered form, and they can be lyophilized up to the time of use without altering the chemical composition.

Apart from analyzing the crude drugs through the identification of various chemical groups, the laboratory is into the isolation of active components from crude drugs either by targeting a molecule or through activity-directed purification, and with the state-of-the-art equipment in the MUPCARL, the purity can quickly be ascertained. In addition, the equipment, including Fourier Transform Infrared, High-Performance Liquid Chromatography, and Ultraviolet-visible spectrophotometer, is helpful in identifying some functional groups, quantifying the active biomarkers, or obtaining a reproducible fingerprint. ●



Industrial Training at The PHARMBIOTRAC Production Laboratory

PHARMBIOTRAC routinely receives students from various faculties, including pharmaceutical Sciences, pharmacy, and engineering for their industrial and laboratory placement are among the key university requirements for undergraduate students at MUST to obtain their degrees.

The students usually spend one to three months in the lab, gaining practical skills in industrial and laboratory settings and actively engaging in research and product development innovation. So, PHARMBIOTRAC has been a destination for the majority of these students.

Since operationalizing the PHARMBIOTRAC production facility in 2019, we have trained over 100 students in different specialization areas, including pharmaceutical biotechnology and traditional medicine. Engineering students are usually engaged in aspects of machinery and automated production processes, where they gain practical skills in equipment and machine maintenance, operations, and principles of automated technologies used in manufacturing industries.

We have received encouraging feedback from the students who have been trained so far. Most of them are now using the skills they gained in various industries in Uganda and beyond. Some of the students, especially those pursuing a degree in pharmaceutical sciences, have also utilized the knowledge obtained from here to develop their own products.

This has indeed projected the University as a true center of excellence in research and product innovation.

As a center of excellence in the region, we have also received national and international calls from the private sector, especially in natural products.

The demand for skilling and technical training in natural products has increased.

PHARMBIOTRAC into designing a hands-on short course titled "***Production and Quality Assurance of Herbal Medicines***" to fill the training gap of herbalists. The curriculum was developed in partnership with various stakeholders, including the regulator of medicines in Uganda (National Drug Authority), herbalist representatives, academia, and the pharmaceutical industry, to practically tailor it to the needs and aspirations of the herbal sector in the region. Due to the impact of COVID-19, there was a delay in the kick-off of the training. Therefore, the team worked diligently to revamp the program so they could enroll in the first class. As stated, we have trained more than 100 students of varying specialization areas.

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Pharmaceutical Science students participating in an herbal syrup product development activity during their industrial placement at the PHARMBIOTRAC Production Laboratory under the supervision of Mr. Jimmy Angupale (PHARMBIOTRAC Product Development Officer), Mbarara University of Science and Technology.



PHARMBIOTRAC LEADERSHIP



From Left to Right - Professor Patrick Engeu Ogwang, Engineer Anke Weisheit, Dr. Robert Tamukong, Dr. Casim Umba Tolo



A cross section of PHARMBIOTRAC staff, which includes academic, technical and administrative staff, respectively.



PHARMBIOTRAC INCUBATION HUB

The center also houses an incubation hub supporting academicians, staff, students, and the private sector in developing products and registering intellectual property (patents or trademarks) and businesses or start-ups. This was a deliberate effort to prioritize universities as significant drivers of economic development through converting knowledge generated from The center as an incubation hub that provides support for academicians, staff, students, and the private sector to develop products, register intellectual property such as patents or trademarks, and create new businesses or start-up companies. This was a deliberate effort to prioritize universities as significant drivers of economic development by converting the knowledge generated from research into commercializable products that can directly address societal challenges and research into a commercially viable product that can directly address society's challenges.



Cross-Section of the different products incubated at the PHARMBIOTRAC Incubation Hub

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The incubation center has established a robust product development ecosystem (a 15-step process) that takes an idea from research findings via product prototyping to commercialization. The hub receives applications from university students at any level, innovators, herbalists, and staff (academic or non-academic) from all over Africa. The applications are scrutinized using a reliable rubric focusing on novelty and feasibility.

The successful applicants then start the incubation process, which begins with refining concepts, developing or improving existing prototypes, obtaining end-user feedback, and following many other steps until the product hits the market.

The process is supported by a pool of technical experts drawn from PHARMBIOTRAC postgraduate students, academia, industry, entrepreneurs/ innovators, product regulatory bodies, business registration/ intellectual property (IP) bureaus, knowledge holders, etc. The incubation center has incubated over thirty innovations covering natural medicines, beverages/ nutraceuticals, biopharmaceuticals, cosmetics, cosmeceuticals, natural additives/ excipients for industries, and others. Some of these product innovations are already in the market, as others are still climbing the ladder to commercialization.

If supported financially and in other ways, the incubation hub will boost Africa's local product portfolio and build independence within the continent regarding healthcare supplies such as medicines.

Some of these products under incubation at the hub are as shown in the pictorials:



One of the new innovations emanating from a PhD Research on antimalarial product development. NovMAL is an antimalarial product formulated into syrups, capsules and tablets for management of malaria. The product is at the stage of preclinical testing and some of the literature are already published in peer reviewed journals (<https://rdcu.be/dvxQJ>).

As the preclinical data on this product accumulates under the PhD research done by our PhD student (Mr. Angupale Jimmy Ronald), there will be need for more funding to take this innovation through clinical trials before it can be accepted in the conventional health care mainstream or get enlisted on essential list of drugs in Uganda and Africa as a whole.



Pearl Products - One of the top-notch innovations of PHARMBIOTRAC Incubation Hub. It is based on the traditional knowledge of Ankole society in western Uganda that uses cow ghee for general nurturing of a soft and spotless skin. Novel Medicinal Formulations Ltd, one of the promising start-ups of PHARMBIOTRAC has prioritized on this knowledge to develop high class cosmetic products that are already entering the Ugandan market with high acceptability. The team was supported by PHARMBIOTRAC to accelerate the prototyping and registration of the company in Uganda.

PHARMBIOTRAC provides critical training, funding, mentoring, and facilities for early-stage startups focused on healthcare solutions. It assesses the market readiness and commercial availability for each of the innovations it incubates, which span novel diagnostics, medical devices, therapeutics, and digitized platforms. This involves working closely with research scientists to evaluate patentability, craft targeted business plans, and build financial models to secure the necessary launch funding.

With innovations at varying technological and commercial readiness levels, PHARMBIOTRAC requires understanding and advising scientists on potential product pipelines. Through extensive market research, the center identifies the most fertile partnership, licensing, and expansion possibilities.

Within five years, PHARMBIOTRAC has successfully incubated over thirty new companies. One highlight has been the launch of herbal lip balm, pearly jelly, and anti-diabetic powder, among many others. Beginning with our in-house prototyping and pilot funding, the center advises its incubatees on crafting a growth strategy focused on East African community clinics. This led to partnerships with regional and international herbal scientists to showcase how PHARMBIOTRAC turns lifesaving ideas into reality.

With our expanded facilities and MUST's increasing research output, PHARMBIOTRAC aims to incubate over 50+ startups in the next five years. The goal is to support our scientists in testing and proving commercial possibilities, connecting them to essential human and financial capital so that innovations can positively impact human health locally and globally.

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Incubatee exhibition Incubatee mentorship session Pearl Products - One of the top-notch innovations of PHARMBIOTRAC Incubation Hub.

It is based on the traditional knowledge of Ankole society in Western Uganda, and cow ghee is used to nurture soft and spotless skin. Novel Medicinal Formulations Ltd, one of the promising start-ups of PHARMBIOTRAC, has prioritized this knowledge to develop high-class cosmetic products already entering the Ugandan market with high acceptability.

PHARMBIOTRAC supported the team to accelerate the prototyping and registration of the company in Uganda.



Incubatee Exhibition



Incubatee Mentorship Session



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Incubatee Lina Mathew is exhibiting during the RUFORUM AGM in Benin 2020

Eng. Anke Weisheit & Lina in Benin 2020

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Eng. Anke Weisheit & Lina in Benin 2020



A Practical Training Session of Local Herbalists in Luuka District (Eastern Uganda) on preparing an herbal mosquito repellent in the form of a jelly.



Our formulation scientist and Ph.D. Fellow (Angupale Jimmy) is demonstrating the filtration process during the production process.



PHARMBIOTRAC Incubatees exhibiting their product innovations to the Vice Chancellor, MUST, Professor Celestino Obua

“Often, people take herbal medicines for a physical response, but what they find is that the body also responds in an emotional way to the plant medicine that they’re taking.”

— Karen Rose

PHARMBIOTRAC SUCCESSES

PHARMBIOTRAC's Incubation Hub aims to support academicians, students, and innovators to start-up businesses and develop, register, and commercialize trademarks, copyrights, and patents to transform universities as significant drivers of the regional economy. Since its inception, the hub has managed to incubate thirty (30) start-up companies, some of them headed by females, with a range of natural products in the area of herbal medicine, natural cosmetics, nutraceuticals, biopharmaceuticals, peptide-based products, pharmaceutical ingredients, and so forth.

Selected images of Prototypes under External Innovations/Products by Incubates (Cohort 1)



Selected images of Prototypes under External Innovations/Products by Incubarees (Cohort 2)





<http://pharmbiotrac.must.ac.ug>



Prototype of Novel Vaseline – Ghee Based



Improved Version Pearl Jelly



Vijex Herbal Pain Tincture



Coca Beet and Beet Fresh beet root yoghurt



Lyyaron Brand Hair oils



Plectratic Herbal Grow Promoter (Animals)



Songs Extra Energy Drink



Ineza Vaginal Spray



Peptide rich Wound treatment



Lemon Aftershave



Coffee Skin Care Products



HEB Lip Balm



Gashom Aloe Vera Jelly



Rheumatoid Powder



Black Jack Herbal Tea



Kachiks Formula



Coconut & Avocado Hair Oil



Standardized Antimicrobial Polyherbal Syrup



NovaCAP



Bidena Plus Spray



TeethDr



BigHen



NEEM+

White Coat Ceremony

The white coat ceremony is a ritual that marks the students' induction into clinical health sciences, and symbolizes a lifelong commitment to dedicated patient care, compassion, and integrity.

On October 18, 2018, PHARMBIOTRAC, under the benefaction of the Faculty of Medicine of Mbarara University of Science and Technology initiated and sponsored a white coat ceremony for incoming students of the pioneer Master of Pharmacy in Clinical Pharmacy degree program in Uganda. This ceremony, the first in its category in Uganda and the East Africa Region marked the entry of the matriculating class of 2018 into the program, and helped students gain a sense of the program's core values of professionalism, respect, integrity, and care.

During the ceremony, students were cloaked in their first white coats to symbolize the trust being bestowed upon them to carry on the noble tradition of patient-centered care. After that, the students took an Oath and pledged allegiance to the profession, deepening their sense of obligation and dedication to service.

Since the first edition in 2018 was a resounding success, the Faculty of Medicine decided to adopt the white coat ceremony as an annual event to include all clinical programs in the Faculty, which include the Master of Pharmacy in Clinical Pharmacy, the Bachelor of Pharmacy, the Bachelor of Medicine and Bachelor of Surgery, the Bachelor of Nursing Science, the Bachelor of Science in Physiotherapy and the Bachelor of Science in Medical Laboratory Sciences.



Students of the 1st cohort of the Master of Pharmacy in Clinical Pharmacy degree program taking the oath during the white coat ceremony



Students of clinical programs in the Faculty of Medicine taking the professional oath during the 2nd edition of the white coat ceremony



Clinical students being clad in their first clinical coat during the 3rd edition of the white coat ceremony hosted by the Faculty of Medicine of Mbarara University of Science and Technology





Ph.D. Graduates and their supervisors from PHARMBIOTRAC supported programs posing for a photograph on graduation day after receiving their awards



Graduation of the of the First Cohort of the Master of Pharmacy in clinical pharmacy

White coat ceremony: Inauguration of Medical Students into the Faculty Medicine

October 19, 2023, was an extraordinary day at Mbarara University of Science and Technology (MUST). We celebrated a significant milestone as the Faculty of Medicine proudly hosted the 4TH white coat ceremony at the pharmacology grounds. It is so notable that MUST is the first-ever university to host the White Coat Ceremony in Uganda and East Africa, marking a historic moment in the institution's legacy in the journey of medical professionals. Why the white coat ceremony? The memorable day started with insights on why the white coat ceremony is vital in a medical school—shared by. Assoc. Prof. Robert Tamukong, originally from Cameroon and a faculty of the University of Menslter, USA, Dr. Robert shared the history of the white coat ceremony and pointed out that this would have been the 6th WCC if it were not for the pandemic. He shared the history of the White Coat Ceremony, tracing its roots to the 1980s when it was first introduced to the field of medicine. The inaugural White Coat Ceremony took place in Chicago in 1989, and since then, these coats have come to symbolize the dignity of the medical profession. Assoc. Prof. Tamukong also expressed his gratitude to the students, emphasizing that being their teacher was an honor. He urged them to savor this unique ceremony, as it is a once-in-a-lifetime experience.

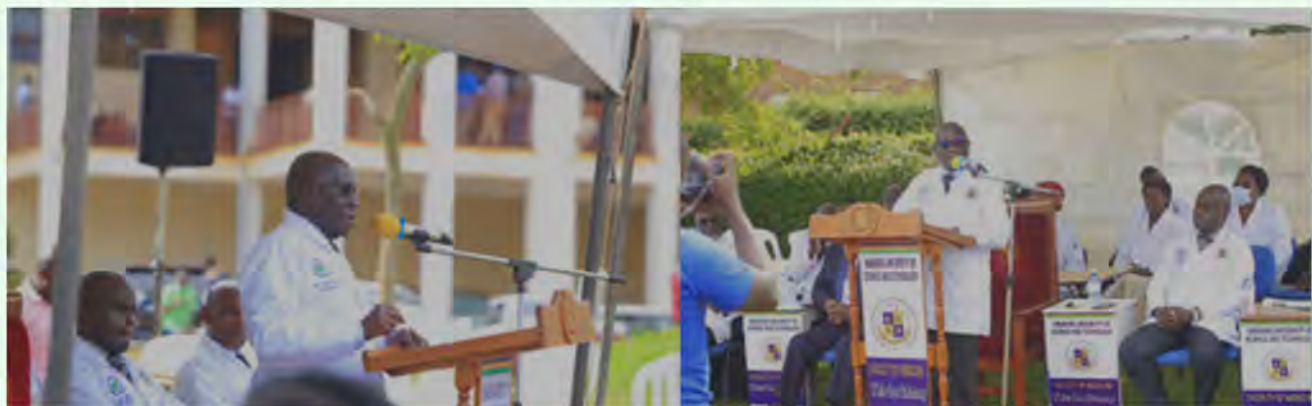


The Associate Professor urged the students to prioritize empathy, collaboration, and ethical healthcare throughout their careers, reminding them that the length of their white coats will ultimately correspond to their qualifications. He encouraged them to be unwavering advocates for patient rights and to never cease their pursuit of knowledge

His remarks were followed by the university Legal Officer Timothy Mugumya (Esq), who shared the legal implications of taking the oath they were about to take, its purpose, and how it can be used as a point of reference in case of breach. He emphasized the importance of upholding the values and principles of the medical school. He pointed out the need for confidentiality and the well-being of patients, which were underscored as non-negotiable principles.



Dr. Ssebutinde Peter, the district health officer of Mbarara and a MUST alumnus, expressed his gratitude to the Vice Chancellor, prof. Celestino Obua and his team for organizing the ceremony. In our days as medical students, we never got a chance to see such insightful events; dear students, count yourselves lucky and blessed. Peter pointed out that the white coats are tools of divine intervention. Patients come to you with hope and faith in getting better; they believe in the profession to handle their challenges. He expressed the need to put patients before money and save lives; the rest will be looked at later. That way, their white coats will be kept stainless in the public eye. He urged the medical students always to dress professionally and implored future doctors to focus on their true mission of saving lives, but not look at the health profession as a business with the attitude of “nfunila muwa?” literary meaning how do I benefit from this.



In a delightful moment, the Dean Faculty of Medicine Assoc. Prof. Joseph Ngonzi welcomed the students to MUST, the region's icon of science, Technology, and innovation. He congratulated them on making it to the best medical school in East Africa. He pointed out the big numbers that apply, but few are taken, and for that, he congratulated them for being the best of the best that made it. He highlighted the transformative power of the white coat and encouraged students to reach out for assistance whenever challenges arise. “The MUST administration has an open door policy, which encourages students to speak out. Don't die in silence,” said Joseph. 🌟

Masters of Clinical Pharmacy



Students of the Master of Pharmacy in Clinical Pharmacy program practicing clinical skills of taking blood pressure readings using a manual blood pressure monitoring device



One student of the Master of Pharmacy in Clinical Pharmacy program making a patient clinical case presentation to her peers during a debriefing session



Students of the Master of Pharmacy in Clinical Pharmacy practicing patient intravenous cannulation skills



Professor Robert Tamukong facilitating a clinical skills practical session with students



Readying Visitors for the “Museum Tour”



Engineer Anke Weisheit presents factual information about the incubator program and the specifics of some of the products created. These include natural medicines from plants and herbs and cosmetics made from natural organics.

Those seated are members of the TAG 4 Change NGO. Creating a product using herbal medicine involves several steps, each critical for ensuring the final product's quality, efficacy, and safety.

A Thorough Explanation of the Process

Research and Sourcing - The first step is thoroughly researching the herbs you intend to use. This includes understanding their medicinal properties, traditional uses, safety profiles, and any existing scientific evidence supporting their efficacy. Once you've selected the herbs, sourcing high-quality raw materials is crucial. This involves finding reputable suppliers who adhere to good agricultural and collection practices to ensure the herbs are grown, harvested, and handled sustainably and ethically.

Quality Control and Testing - Quality control is paramount in herbal product manufacturing. This involves testing raw materials for identity, purity, potency, and safety. Methods such as chromatography, spectroscopy, and microscopy confirm the identity of herbs and detect contaminants or adulterants. Testing for microbial contamination, heavy metals, and pesticides ensures product safety.

Extraction and Processing - Herbal extracts are typically obtained through various methods such as maceration, percolation, distillation, or solvent extraction. The chosen method depends on the properties of the herbs and the desired constituents. Careful attention is paid to factors like temperature, solvent choice, and extraction time to maximize the yield of bioactive compounds while minimizing degradation. After extraction, the resulting extracts may undergo further processing steps such as filtration, concentration, or standardization to ensure consistency and potency.

Formulation and Product Development—Formulating an herbal product involves blending specific herbs and extracts in precise ratios to achieve the desired therapeutic effect. Other ingredients, such as excipients, binders, and fillers, may also be included to improve stability, bioavailability, or taste. The formulation considers factors like solubility, compatibility, and synergistic interactions between herbs to optimize efficacy.

Manufacturing and Production—The product moves to the manufacturing phase once the formulation is finalized. This involves mixing the ingredients according to the established formula, followed by tableting, encapsulation, or liquid filling. Good Manufacturing Practices (GMP) are followed rigorously to ensure cleanliness, hygiene, and consistency throughout production. Batch records are maintained to trace each product back to its raw materials and track any deviations from the established procedures.

Quality Assurance and Testing - Quality assurance measures are implemented throughout the manufacturing process to verify the integrity of the product. In-process testing ensures that critical parameters such as weight variation, disintegration, and dissolution meet specifications. Finished products undergo final testing to confirm identity, potency, purity, and safety before being released for distribution.

Packaging and Labeling - Proper packaging protects the product from moisture, light, and oxygen, which can degrade its quality over time. Additionally, labeling requirements must be met to provide consumers with accurate information about the product, including its ingredients, dosage instructions, precautions, and storage conditions. Compliance with regulatory standards and guidelines is crucial to ensure product legality and consumer safety.

Regulatory Compliance and Documentation - Herbal products are subject to regulatory oversight to meet safety, quality, and efficacy standards. Depending on the country or region, manufacturers may need licenses, permits, or registrations before marketing their products. Detailed documentation, including formulation records, batch records, and stability testing data, must be maintained to demonstrate compliance with regulatory requirements.



In what is known as “The Product Museum,” Engineer Anke Weisheit instructs the TAG 4 Change team, Dr. Casim Umba Tolo (center back), and Professor Peter Engeu Ogwang (far left) on the specific medicinal benefits and nutritive power of products developed. Engineer Weisheit explains the iterations of some of the products as we observe (below)





"Whereas an allopathic approach seeks cure (based on some objective criteria), a naturopathic approach aims for healing which will be based in large part on subjective (the patient's) criteria... a pattern of healing that includes physical, emotional, and social functioning."

-Christa Louise, PhD

An Eastern and Southern Africa Higher Education Centers of Excellence Project at Mbarara University of Science and Technology

(PHARMBIOTRAC), Mbarara University of Science & Technology (MUST), P. O. Box 1410, Mbarara, Uganda Corresponding author:tolocas@must.ac.ug Abstract A regional approach to higher education in Africa offers the best way to build and sustain excellence in higher education in African economies, and to develop the human resources required to address key development challenges facing Africa. One of the critical development challenges facing Africa is a low life expectancy and productivity compared to other continents, majorly due to a high burden of both communicable and non-communicable diseases, a situation made worse by inadequate yet expensive good quality drugs not easily accessed by the population. Yet Africa has a rich biodiversity that forms the continent's natural wealth on which its social, cultural, and economic systems are based, and this is particularly true for eastern and southern African regions.

Traditional Medicine (TM) and Traditional Medicine Knowledge (TMK) systems form part of this wealth but have not been science-driven to improve the region's quality of life and productivity. Apart from TM, African biodiversity has enormous potential to produce modern drugs such as high-value biopharmaceuticals, but it has yet to be scientifically explored and developed. Biopharmaceuticals are therapeutics derived from biological or living organisms through pharm-biotechnology applications. While several other factors may contribute to the under-exploitation of TM, TMK systems, and the low application of pharm-biotechnology to biodiversity in Africa, the critical factor still needs to be improved in the number of scientists specializing in TM and pharm-biotechnology. To respond to this gap, Mbarara University of Science and Technology (MUST), through the World Bank's African Centres of Excellence (ACE) initiative is creating, in the region, a unique framework by establishing "Pharm-Biotechnology and Traditional Medicine Centre" (PHARMBIOTRAC) to build capacity in the region to train and raise a critical mass of specialized and skilled human capital that can use multidisciplinary and transdisciplinary approach to advance traditional medicine and pharm biotechnology. The specialists to be produced at this center will be experts in critical areas, including reverse metabolomics, genomics, and proteomics (molecular characterization, structural elucidation, and modification of drug molecules or drug receptors) with the potential to spur drug discovery, and specialists in the production and use of high-value biopharmaceuticals and TM products for uptake by pharmaceutical and herbal medicines industries in the region and beyond. Through linking research and education to industry, the research outputs and the graduates of PHARMBIOTRAC will be absorbed by the private sector industry to mass produce high-value, science-driven TM products and biopharmaceuticals highly needed for disease control and prevention worldwide. 🌱

Uganda National Drug Authority Approves COVIDEX Local Herb Medicine

Collins Kakwezi June 29, 2021, 12:28 pm



By Agnes Kiconco

KIU, Main Campus—The National Drug Authority (NDA) approved COVIDEX, a local medicinal herb, today, June 29, as a supportive drug treatment for COVID-19 and other virus infections. After days of research and collaboration with the developer, Prof. Patrick Ogwang, the NDA approved the herbal drug as safe and ready for human consumption. Thus, the drug has been licensed and approved to be sold in pharmacies as a supportive treatment for COVID-19.

"Today, June 29, 2021, the Uganda National Drug Authority has notified Covidex as a supportive treatment in the management of viral infections and can now be accessed in all licensed drug outlets," tweeted UNDA on its official Twitter page.

In addition to the notification, the NDA cautioned the public to avoid self-medication and take the local medicinal herbs and other drugs on the advice of a professional health worker.

Earlier, Dr. David Nahamya, the Secretary for the National Drug Authority (NDA), warned people to go slow on COVID-19 medication without the correct diagnosis because the side effects are enormous.

Professor Patrick Engeu Ogwang's Covidex



The committee led by Dr. Stevens Kisaka, whose members include Jolly Uzamukunda, Sarah Nyachwo, Professor Nixon Kamukama, and Dr. Robert Bitariho, released a 16-page report this week with ten conclusions. The pick is "Covidex is a product that was originated by Jena Herbals Uganda, Ltd. and was in existence prior to the implementation of the research grant that the government extended to MUST through the Technology ministry." 🍌



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Early Days

Excerpt from the Grant Application Paper by Dr. Casim Umba Tolo

Africa has a rich biodiversity that forms the continent's natural wealth on which its social, cultural, and economic systems are primarily based. Yet, Africa still has a low life expectancy and economic productivity compared to other continents. This is majorly due to a high burden of infectious diseases such as malaria, HIV, tuberculosis, etc., and now also rising cases of non-communicable diseases, hence causing a dual health challenge. Non-communicable diseases such as cancers, diabetes, hypertension, stroke, obesity, and chronic respiratory disease are becoming rampant killer diseases and are predicted to overtake infectious diseases soon.

This situation is made worse by inadequate yet expensive drugs, and even where drugs are available, counterfeit drugs continue to flood the market, with up to 35% of antimalarial drugs accessed by the population reported as being counterfeit products. However, for ages, Traditional Medicine (TM) and Traditional Medicine Knowledge (TMK) systems have formed part of Africa's wealth but have not been science-driven to improve quality of life and productivity in the region (e.g., Ogwang et al., 2008; Weathers et al., 2014; Ogwang et al., 2015). Apart from TM and TMK,

Africa's biodiversity has enormous potential to produce modern drugs such as high-value

biopharmaceuticals, but it has yet to be scientifically explored and developed widely. In addition, more work must be done to validate TM and TMK clinically.

The lack of clinical evidence creates a huge knowledge gap that limits its use by biomedical health practitioners. This, in turn, limits potential investment in TM-related drug discovery and product development by the private industry. While several other factors may be contributing to under-exploitation of TM and TMK systems and low application of pharm-biotechnology in Africa, the key factors remain inadequate number of scientists specialized in TM and pharm-biotechnology, lack of multi-disciplinary and trans-disciplinary research teams, lack of appropriate equipment and skills, lack of specialized training in the region to raise the critical mass of scientists in TM and pharm-biotechnology, poor linkages with private sector and non-involvement of TMK holders in the training and research programs. To address the above challenges,

Mbarara University of Science and Technology (MUST), through the World Bank's African Centers of Excellence (ACE) initiative, is creating, in the region, a unique framework to produce specialized and highly skilled graduates (Goddard and Chatterton, 2003) that will exploit the rich flora and fauna to develop high-value science -

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Early Days

driven TM products and biopharmaceuticals to address not only Africa's development challenges but also preserve local biodiversity. The ACE will create a conducive and enabling environment for curriculum review and development to create specialization in science-driven TM and pharm-biotechnology training, research, and product development at the postgraduate level. Equipped with state-of-the-art equipment, the Pharm-Bio Technology and Traditional Medicine Centre (PHARMBIOTRAC) will be the region's center of excellence (Arbo and Benneworth, 2007; Salmi et al., 2016) in science-driven TM and Pharmbiotechnology.

The center will specialize in systematic identification, documentation, mapping, conservation, commercialization, harvesting, extraction, isolation, characterization, structural elucidation, and modification of active molecules from plants and other life forms for the production of high-value science-driven TM and biopharmaceutical products for uptake by pharmaceutical and herbal medicines industries in the region.

The main objective of PHARMBIOTRAC is to build a critical mass of specialized and skilled human resources that can advance traditional medicine and Pharma-Biotechnology for Africa's socio-economic development. The specific objectives are to: i. Strengthen capacity in the region to train highly skilled and specialized professionals in traditional medicine and Biopharmaceuticals; ii.

Strengthen the region's capacity to engage in cutting-edge research in TM and systems biology for health product development; iii. Create capacity in collaboration with the private sector industry for developing, producing, and commercializing TM, biopharmaceuticals, and nutraceuticals from research outputs; iv. Advance the practices of TM/TMK in the region and promote domestication and sustainable utilization of medicinal species.

Operationalization of PHARMBIOTRAC

Mbarara University of Science and Technology (MUST) is mandated to teach both undergraduate and graduate programs (MSc and Ph.D.) and short courses. The University also promotes the transfer of scientific knowledge and innovations to the community for sustainable societal transformation. PHARMBIOTRAC will attract multidisciplinary students from the region, including botanists, biochemists, chemists, pharmacologists, engineers, pharmacologists, pharmacists, microbiologists, biotechnologists, entrepreneurs, and train them through transdisciplinary approaches to build teams for joint projects and enterprises. PHARMBIOTRAC will use scientific methods to improve TM products and to identify active molecules that can be developed into biopharmaceuticals. To achieve its goal, PHARMBIOTRAC will augment its existing teaching faculty by attracting and recruiting specialist hands-on scientists and practitioners from the region and mentoring them in collaboration with professors from partner universities in the USA, India, and South Africa. Through the transdisciplinary approach of graduate training and specialization, the center will support the development of science-driven TM products and biopharmaceuticals, leading to their commercial production in the region by private sector industries. By linking research and education to industry, the research outputs and the graduates will be absorbed by the private sector industry to mass-produce high-value science-driven TM products (e.g., Weathers et al.,

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Early Days

2014; Ogwang et al., 2015)). Biopharmaceuticals are highly needed for disease control and prevention worldwide.

The application of Pharm-biotechnology, particularly systems biology, will spur drug discovery, which in turn would lead to the production of biopharmaceuticals for national, regional, and international markets. In addition to the biopharmaceutical industry, the graduates of PHARMBIOTRAC will serve as faculties in partner universities and other organizations in the region to train more specialists in TM and biopharmaceuticals. Over the project period of five years, PHARMBIOTRAC is envisioned to have some significant outputs, not least producing specialized and highly skilled graduates who can contribute positively to validating the efficacy of TM with clinical evidence.

This is expected to promote the use of TM by biomedical health practitioners, leading to potential investment in TM-related drug discovery and product development by the private pharmaceutical industry, hence improving the quality of life and productivity of the people in the region. Table 1 provides a summary of the expected results of PHARMBIOTRAC and anticipated impacts. ●



File Photo

Community Engagement

(Medical camps, student placements, herbalist trainings etc.)

Beyond the laboratory, PHARMBIOTRAC is deeply committed to community engagement. The Center conducts outreach programs, educational workshops, and collaborative initiatives with local communities to ensure that the benefits of their research translate into tangible improvements in healthcare outcomes and livelihoods.



Professor Robert Tamukong briefed students on standard operating procedures before the medical camp outreach began in Nyeihanga, a small rural community in Southwestern Uganda not very far from the Rwandan border.



Mbarara University students screening for Diabetes among the population during the medical camp outreach in Nyeihanga.



Mbarara University students counseling patients on prevention of various non-communicable diseases during a medical camp in Isingiro, a rural community in Southwestern Uganda.



Community members waiting their turn to be evaluated for medical needs

Community Training of Herbalists to Improve Their Practices

Traditional herbal medicine and indigenous practice constitute a major component of the Uganda healthcare system, with an ever-increasing attention and interest in their use in recent times. The remedies are used widely to manage various medical conditions, including non-communicable diseases, infectious diseases, and many other chronic and acute medical conditions, among the communities, especially in people dwelling in rural settings. For example, the use of medicinal plants is increasing globally by 50-95 % (Pan et al. 2019; Asimwe et al. 2021).

The situation in Africa is similar, as more than 80% of the population, especially in developing countries, directly depends on plants for their basic medical needs (Tugume & Nyakoojo, 2019). Plants make an essential part of health care, especially for the poor populations, and it is on that ground that the Government of the Republic of Uganda has primarily focused on the use of herbal medicine and is in the process of assimilating it into the primary health care system (Kamatnesi et al. 2011). As a result, the government of the Republic of Uganda enacted the law 'The Indigenous and Complementary Medicine Bill 2015', accented by the president on 14th September 2020 (Mwaka et al. 2019).

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However, despite the therapeutic benefits of herbal medicine in Uganda, more is needed to know about their safety profiles, side effects, toxicities, and efficacy, as minimal data on the specific types of herbs is available. The lack of proper standardization and quality control mechanisms in the herbal medicine practice and the erratic nature of the practice leave the consumers and the population at large at a high risk of harm.

Fortunately, Uganda now has a recently established policy to help regulate herbal medicines, the Traditional and Complementary Medicines Policy (TCMP) 2019, which aligns with the policy's general objectives in supporting the National Development Plan (NDP) 2020/2021.

Additionally, MUST, through its Higher Education Center of Excellence in Pharm-Biotechnology and Traditional Medicine (PHARMBIOTRAC), was established in 2017 to build a critical mass of specialized and skilled human resources that can advance traditional medicine and conducts research and training in the standardization of herbal medicine products and practice in Uganda.

It is against this background that PHARMBIOTRAC is partnering with communities across Uganda to train herbalists and traditional medicine practitioners in various areas of expertise to improve their practice. The trainings offer many unique learning and practice experiences in multiple modules, including classroom and hands-on exercises, thus allowing herbalists to develop self-reliance, autonomy, initiative, flexibility, and safety in their practice.

Objectives of the Training

The main objective of the training is to provide opportunities for herbalists and other traditional medicine practitioners in the communities to gain real-time learning exposure and experience to further develop their skills and abilities alongside other practitioners and professionals.

Specific objectives:

1. To enhance cross-understanding, learning, and knowledge sharing between the trainees and the facilitators, as well as among the herbalists and traditional medicine practitioners.
2. To teach the herbalists and traditional medicine practitioners in the various communities about the fundamentals of using herbal techniques as restorative health care.
3. To introduce to the traditional medicine practitioners the four core principles of healthcare practice: beneficence, non-maleficence, autonomy, and justice.
4. To Integrate theory and practice by providing relevant skills training.
5. To learn to appreciate traditional medicine practice and its role in the economy.
6. To improve their understanding of the uses and effects of medicinal plants, including herbal supplements.
7. To introduce traditional medicine practitioners to a basic understanding of anatomy and physiology, i.e., basic structures and functioning of the **body cause and transmission of common diseases**.
8. To assist trainees in developing/clarifying career interests and abilities in a safe and structured environment with help from experts, an opportunity to exchange ideas, and a platform for Networking opportunities.

Structure & Activities of the Training Program

The two-day training program entails structured learning in a real work environment. The trainees are expected to gain valuable experience in the practical skills required for their respective qualifications as herbalists and traditional medicine practitioners.

Each day will cover approximately 6-8 hours of activities between 9 a.m. and 5 p.m. Trainees are expected to participate in all the teaching and learning activities and interact closely with the facilitators and other members of the herbalist community in health promotion and engagement activities.

Much of the trainees' time will be spent in a practical setting, learning to integrate practice with knowledge, values, and skills. While Day 1 will focus on theory, Day 2 will include valuable and hands-on activities.

Some Selected Course Modules for the Training include but are not limited to, the following

- Basic ecology, plant conservation, and home hygiene
- Basic structures and functioning of the body cause and transmission of common diseases
- Medicinal herbs that prevent and treat simple common illnesses (malaria, diarrhea, obesity, allergies, diabetes, ulcers)
- Collection of medicinal plant species from the wild and conserved area, identification, and documentation
- Cultivation and sustainable harvesting of medicinal plant materials
- Basic quality control principles, techniques, and methods for medicinal plant raw materials
- Preparation, preservation, and packaging of medicinal products: powders, granules, mosquito repellents, herbal soaps, herbal cream, herbal tinctures, and syrups
- Basic quality control principles, techniques, and methods for herbal products
- Good Manufacturing Practices (GMP) in the production of herbal medicines – personnel hygiene, gowning, documentation, facility hygiene, and general organization of production facilities
- Basic Regulatory Guidelines for Herbal Medicines in Uganda



Training of Herbalists in Luuka District (Eastern Uganda), In the lab coat is Mr. Angupale Jimmy (Product Development Officer, PHARMBIOTRAC) taking the selected participants through a practical process of herbal syrup preparation. 🍌



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2. To teach herbalists and traditional medicine practitioners in various communities the fundamentals of using herbal techniques as restorative healthcare
3. To introduce to the traditional medicine practitioners the four core principles of healthcare practice: beneficence, non-maleficence, autonomy, and justice
4. To Integrate theory and practice by providing relevant skills training
5. To learn to appreciate traditional medicine practice and its role in the economy
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7. To introduce traditional medicine practitioners to a basic understanding of anatomy and physiology, i.e., basic structures and functioning of the body cause and transmission of common diseases
8. To assist trainees in developing/clarifying career interests and abilities in a safe and structured environment with help from experts, an opportunity to exchange ideas, and a platform for Networking opportunities

STRUCTURE & ACTIVITIES OF THE TRAINING PROGRAM

The training program will run for two days and entails structured learning in a real work environment, whereby the trainees are expected to gain valuable experience in the practical skills required for their respective qualifications as herbalists and traditional medicine practitioners.

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Community Training

A significant portion of the trainees' time will be spent in a practical setting, learning how to integrate practice with knowledge, values, and skills. While Day 1 will focus on theory, Day 2 will consist of practical and other hands-on activities.

Some Selected Course Modules for the Training include, but are not limited to, the following:

- Basic ecology, plant conservation, and home hygiene
- Basic structures and functioning of the body cause and transmission of common diseases
- Medicinal herbs that prevent and treat simple common illnesses (malaria, diarrhea, obesity, allergies, diabetes, ulcers)
- Collection of medicinal plant species from the wild and conserved area, identification, and documentation
- Cultivation and sustainable harvesting of medicinal plant materials
- Basic quality control principles, techniques, and methods for medicinal plant raw materials
- Preparation, preservation, and packaging of medicinal products: powders, granules, mosquito repellents, herbal soaps, herbal cream, herbal tinctures, and syrups
- Basic quality control principles, techniques, and methods for herbal products
- Good Manufacturing Practices (GMP) in the production of herbal medicines – personnel hygiene, gowning, documentation, facility hygiene, and general organization of production facilities
- Basic Regulatory Guidelines for Herbal Medicines in Uganda



Herbal Garden Activities

(ethnobotanical survey, germplasm collection, tree nursery, gardening)



Students of the Master of Pharmacognosy and Natural Medicine Science program posing during a field cultivation exercise of medicinal plants at Aloesha Organics in Kampala

Herbal medicine has a long history of traditional use in Uganda for treating various diseases. There is also growing global interest in scientifically validating the safety and efficacy of herbal remedies as affordable treatment options. PHARMBIOTRAC at MUST is dedicated to research in traditional herbal medicine and has expertise in areas like pharmacology, pharmacognosy, toxicology, microbiology, taxonomy, and pharmaceutical sciences. An on-campus herbal garden will significantly aid our research and educational initiatives.

It is against this background that the PHARMBIOTRAC Botanical Garden (Living Gene Bank) of Medicinal Plants was established at Mbarara University of Science and Technology (MUST), Uganda is the centerpiece working on ex-situ conservation, nature education, and research and development around medicinal plant species.

Aim

To establish in-situ & ex-situ conservation of medicinal plants and trees by creating a living gene bank (Botanical Garden) at Mbarara University of Science and Technology that will constitute collections from 4 geographical regions of Uganda with a provision for regional/international collections of rare medicinal plant species, as well as buildings housing Botanical Garden Management facilities and Green Zones for nature, scientific, and recreational tours.

a) Specific objectives

Specific objectives of the PHARMBIOTRAC Botanical Garden (Living Gene Bank) of Medicinal Plants at Mbarara University of Science and Technology (MUST), Uganda, are to:

- Create a living biorepository that preserves the genetic material of medicinal species (ex-situ conservation)
- Propagate critical medicinal plants for cultivation and make seedlings available to the public

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Herbal Garden

- Cultivate and conduct harvesting trials of medicinal plants
- Encourage domestication of rare but valuable medicinal species
- Establish a herbarium to facilitate the correct identification of plant species in the garden
- Create a database of medicinal plant species for Uganda and international collections.
- Facilitate partnerships locally and internationally
- Establish vehicular and pedestrian circulation infrastructure for visitors, employees, and operational activities, such as paths, roadways, and parking areas, and put up signage and permanent exhibitions in the Botanical Garden Management facilities
- Inform young people in both community and schools (pupils and students) and the general public about scientific and recreational tours
- Erect buildings housing Botanical Garden Management facilities, research and development laboratories, Gene bank, and Green Zones for nature, scientific, and recreational tours

g) Justification/Expected outcomes

The following are the justifications for establishing the PHARMBIOTRAC Botanical Garden (Living Gene Bank) of Medicinal Plants at Mbarara University of Science and Technology (MUST), Uganda, and the expected outcomes:

- Documentation of medicinal plants at the PHARMBIOTRAC conservation area and the consequent establishment of a living gene bank will enhance further studies, which will justify the inclusion of traditional medicine in Uganda's primary health care system. In addition, new drugs may be discovered, which in turn are expected to be commercialized through industry
- Establishing a botanical garden (living gene bank) of medicinal plants will be the first ever in situ and ex-situ conservation platform at Mbarara University of Science and Technology. This living biorepository will enhance the preservation of genetic material of medicinal species, their propagation for cultivation, and make seedlings available to the public
- Documentation of medicinal plants in the PHARMBIOTRAC conservation area and the consequent establishment of a living gene bank will enhance further studies, which will justify the inclusion of traditional medicine in Uganda's primary health care system. In addition, new drugs may be discovered, which in turn are expected to be commercialized through industry

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Herbal Garden

- Undertaking programs of domestication of rare but valuable medicinal species and variety breeding, and promotion of the development and use of proper cultivation practice will contribute to a decrease in the volume of medicinal plants harvested and enhance the recovery of their wild resources, consequently decreasing their prices to a more reasonable range
- Medicinal plant materials harvested could be used for value addition and further product development and industrialization
- Demarcation of a natural conservation area for medicinal plants will be vital for plants to retain their efficacious properties
- The establishment of a herbarium will enable the storage of reference material; it will be a means of identification, an arbiter of correct names, and a comprehensive data bank for teaching and scientific research on medicinal plants and their conservation
- Sensitization of students and the public at large about the usage of medicinal plants based on indigenous knowledge in colleges, universities, hospitals, and other places of educational/ recreation/ public importance will be enhanced
- The creation of a database on medicinal plants will contribute immensely as a hub for networking traditional medicine practitioners and the scientific community
- An avenue for proper documentation, data collection, propagation, harvest, and post-harvest management operations will be established
- Facilitation of partnerships locally and internationally and sharing of expert knowledge

- Overall, the PHARMBIOTRAC conservation strategy will contribute to one of the targets of the Global Strategy for Plant Conservation (GSPC), which is to have 70% of the world's threatened plant species conserved ex-situ (Callmänder et al., 2005; Sharrock and Jones, 2010; Huang, 2018)

Methodology (Proposed Model of Establishment of the Garden)

It is proposed that the model for Establishing PHARMBIOTRAC *Botanical Garden* (Living Gene Bank) of Medicinal Plants at Mbarara University of Science and Technology (MUST), Uganda, will be unique in its kind but open to in-cooperate similar models and approaches and to draw and leverage on expertise and resources of partners in collaboration with MUST, Uganda.

Map of the PHARMBIOTRAC Botanical Garden

General Area

The area covered by the PHARMBIOTRAC Botanical Garden (Living Gene Bank) of Medicinal Plants at Mbarara University of Science and Technology (MUST) is located at Kihumuro Campus, with the garden representing an area of 17.85 Hectares, equivalent to 44.11 Acres. The collections represent all four (4) geographical regions of Uganda, and one unit is set aside for regional/international collection of medicinal plant species for conservation and research.

Build Environment (BGM)

The Botanical Garden Management Zone and Visitor reception/ Hospitality area comprise central administration, research and development laboratories, a herbarium, a gene bank, a tissue culture laboratory, a visitor information center, a children's/ experiential laboratory, and seminar facilities.

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Herbal Garden

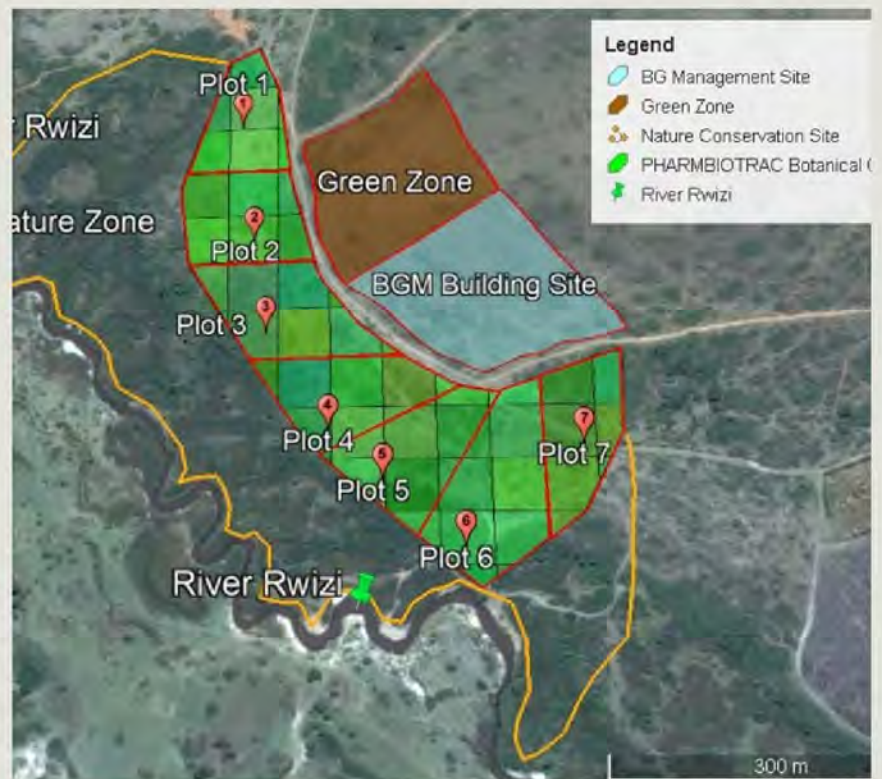
The Green Zone

The green zone hosts recreational facilities, including a 50-bed guest house, a camping site with public showers and toilets, a ceremonial ground, a campfire, and a public meeting/interaction space.



Dr. Eunice Apio Olet, In Charge of the PHARMBIOTRAC Herbal Garden giving a press briefing about the different propagation and cultivation processes of the medicinal plants in the PHARMBIOTRAC Living gene bank at the Kihumuro University Campus

In-Situ and Ex-Situ Conservation of medicinal plants and trees established through creating a living gene bank (Botanical garden of PHARMBIOTRAC) at MUST – representing all four geographical regional of Uganda and one unit for regional collection of medicinal plant species.



Artistic Impression of Some Elements of the Garden



Main Gate outside view



Main Gate inside viewing the reception



Signage and walk ways



General impression of landscaping

Proposed design for an open walking path for the public to become aware of the Medical Flowers. Some of the finishing touches include plaques at each plant with its common name as well as its scientific nomenclature.



There's a lot more work than what goes on in the labs. Here, staff perform various tasks to prepare and manage the botanical garden.



In addition to preparing the soil is to ensure that proper separation between species is critical





Fencing activities of the PHARMBIOTRAC medicinal garden and living gene bank





Plant specimen and germplasm collecting expeditions to populate the medicinal garden



Managing the health and growth data takes a vigilant eye and constant care

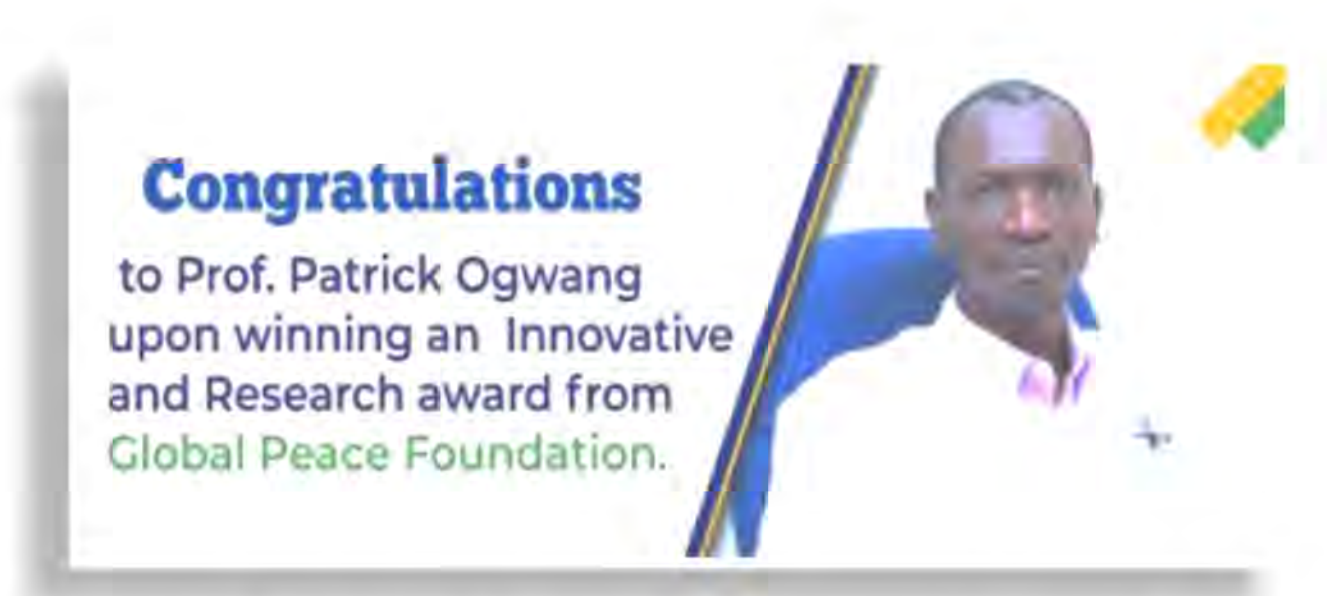


One of the many critical tasks for developing a medicinal garden is to perform extensive soil testing





Seedling establishment in the nursery bed



On November 16, 2022, Prof. Ogwang won an innovative research award from the Global Peace Foundation because of his outstanding commitment to fighting the COVID-19 pandemic using indigenous knowledge and herbal medicine. The Global Peace Foundation conducted a countrywide survey with partners in Uganda, and Prof. Ogwang Patrick was identified and recommended as an authority in research and innovation. He was awarded during the National Dialogue on Sustainable Future, which took place on November 16, 2022, at the Imperial Royale Hotel Kampala. Prof. Ogwang Patrick is an inventor of COVIDEX, a natural herbal for supportive treatment in managing viral infections (COVID-19) under his Jena Herbals Uganda Ltd. He is an associate professor of pharmacy in the Department of Pharmacy, a faculty member of medicine at Mbarara University of Science and Technology, a medical researcher, an entrepreneur, and an executive chairman of Jena Herbals Uganda Limited. He is also the immediate Past President of the Council of the Pharmaceutical Society of Uganda, a body that governs pharmacists and their practices in Uganda. Prof. Ogwang's research focuses on testing, developing, and producing medicines from plants based on traditional medicine, knowledge, and scientific laboratory evidence. 🌱

PHARMBIOTRAC ENGAGEMENTS



The leadership of PHARMBIOTRAC in a strategic meeting with a visiting professor from Gezira university, Sudan



MOU signing between the two Vice Chancellors of Mbarara University of Science and Technology and University of Malawi, respectively



Partnership

Partnership meeting between Friends of PHARMBIOTRAC Foundation (FPF) team and TAG4Change team members–Uganda during Uganda North America Association (UNAA) Annual convention in Dallas, Texas, September 03, 2023, in Hilton Anatole Hotel, Dallas, Texas.



A cross-section of PHARMBIOTRAC staff, which includes leadership, academic, technical and administrative staff, respectively.

KEY STAFF CVs



Dr Hilda Ikiriza

As a pharmaceutical Biotechnologist with a keen interest in research and development (R&D), I possess a solid academic background and expertise in the intersection of pharmaceuticals and biotechnology, including plant tissue and cell culturing skills, plant genomics skills including genotyping by sequencing, Phytochemistry and fingerprinting skills like TLC, HPLC, and GC/MS and Pharmacological analytical skills on plant extracts.

Dr. Hilda Ikiriza (Ph.D.), Senior research scientist PHARMBIOTRAC, hikiriza@must.ac.ug



Kia Janet

As a student of computer engineering in my final year at Mbarara University of Science and Technology, I am passionate about using technology to solve problems and make a positive impact on the world. I possess solid skills in both hardware and software programming; I am fluent in these languages: -react JS, Javascript, CSS, and HTML, python, mongo dB, mySql, among others.

I am also a good UI/UX designer in Figma and Adobe Illustrator. I am currently volunteering as a communication officer at PHARMBIOTRAC, kiajanet54@gmail.com, +256-780-97-4426



Chemutos Tonny

Chemutos Tonny is an aspiring biologist with a passion for microbiology and parasitology. Currently pursuing his Master of Science in Biology with a specialization in Microbiology and Parasitology at Mbarara University of Science and Technology, commenced with his Bachelor of Science degree with a focus on Biology, also earned at Mbarara University of Science and Technology. During his undergraduate years, he honed his understanding of biological principles, laying the foundation for his future endeavors in the field.



BAGONZA BABIIHA ALEX

SENIOR BUSINESS DEVELOPMENT SPECIALIST PHARMBIOTRAC.

Experienced financial services professional with over 15 years of expertise spanning accounting, financial analysis, budgeting, payroll, tax preparation, and reporting. Instrumental in streamlining processes and implementing solutions to improve financial operations.

Contact - <https://www.linkedin.com/in/alex-bagonza-02a86836/>



ANGUPALE JIMMY RONALD

Jimmy is a self-driven, enthusiastic, and passionate pharmaceutical scientist specializing in medicinal product formulation and manufacturing innovations. My definite major purpose is to transform the pharmaceutical science institutions/schools in Uganda into major drivers of world-class pharmaceutical product innovations and the development of robust manufacturing systems in Africa through high-impact research and the training of highly skilled generations of pharmaceutical scientists.

Pharmaceutical Scientist (BSc, MSc, & PhD Fellow Pharmaceutics)|
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WhatsApp: +256750538198| A Member AAPS, <https://www.aaps.org>

Publications: <https://orcid.org/0009-0009-5891-7587>



EMMANUEL B.K AHEEBWE

As a biologist and public health specialist with a keen interest in traditional medicine health policy and scientific management styles, I am an advocate for integrating traditional medicine and indigenous knowledge into routine conventional and modern healthcare systems. I possess solid skills in management and administration using a multifaceted and interdisciplinary scientific approach. I am also excellent in team building with cutting edge communication skills. All these mentioned and non-mentioned attributes make me an outstanding and fortified secretariat leader.

Emmanuel B.K Aheebwe PHARMBIOTRAC Administratore
aheebwe@must.ac.ug; emmabk10@gmail.com

Key Achievements in Financial Year 2022/2023

The following are key achievements of the reporting period.

S/N	Project	Summary of Output NDPiII	SDG Addressed Area	Alignment
1	Training of Highly Skilled Qualified Students	Total 18 - 3 Female and 15 Male enrollment and Professional Performance Regional and National in Traditional Medicine and Bio-Pharmaceutical	Ensure healthy lives and promote for all at all ages (SDG 3)	Enhance Value Add in Key Growth Opportunities (SO1)
2	Partnerships and Collaborations	Partnerships MoUs signed for collaboration in applied research and training entered into by PHARMBIOTRAC/ MUST with National-Maganjo, Kampala City; Regional-Gary Holmes Hospital; and University of Buea, Cameroon	Ensure inclusive and equitable quality of education and promote life-long learning opportunities for all (SDG4)	Strengthen the private sector to create jobs (SO2)
3	Advancing Regionalized, Cutting-Edge Research	International Accreditation of programs with ASIIN GmbH, Germany: [1] Master of Science in Pharmacology (Msc. Pharmacol); [2] Master of Pharmacy (Clinical Pharmacy) Mpharm-Clin. Pharm, and [3] Master of Science in Pharmacognocny and Natural Medicine Science M.Sc. PMNS.	Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation (SDG9)	Enhance the productivity and social well-being of the population (SO4) PHARMBIOTRAC operations fast-tracks the realization of NDPiII programs including [1] Agro-Industrialization [2] Innovation, Technology development and Transfer [3] Manufacturing, [4] Energy Development and [5] Mineral Development A lot of research institutions gain from these partnerships and a lot more the productive sector/industry and community gain from such collaborations thereby contributing to the overall transformation of the country.
4	Industrialization	51 Faculty and Student Exchanges to promote research and teaching with national and international institutions	Strengthen the means of implementation And revitalize the Global Partnership for Sustainable Development (SDG 17)	
5	Advancing Regionalized Cutting-Edge Research	16 International Recognized Research Publications in Disciplines supported by PHARMBIOTRAC		
6	Revenue Generated	Amount Received From IDA Funds: USD:211,000 and Amount Externally Generated: USD:164,017		

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Key Achievements in Financial Year 2022/2023

The following are key achievements of the reporting period.
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7	Private Sector Industry Collaborations Key Sustainability Pathways	<p>The Friends of PHARMBIOTRAC Foundation (FPF) is a 501(c)(3) tax-exempt nonprofit organization registered as a public charity in the USA with the Employer Identification Number (EIN#) 88-3446909. The Organization is also incorporated as a nonprofit organization in Uganda with the registration Number as 8002003766450, and also registered with the National Bureau of NGOs with the registration Number 7276 and operation permit Number 8655. The Foundation was established as a sustainability measure for the Pharm-Biotechnology and Traditional Medicine Center (PHARMBIOTRAC) which is an African Higher Education Center Of Excellence (ACEII) at the Mbarara University of Science and Technology (MUST), Uganda.</p> <p>Funding by BRIDGIN Foundation: Grant Award of USD 40 Million (SDG 4) for construction of ultramodern quality education.</p>
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END OF REPORT



Friends of PHARMBIOTRAC Foundation

Introducing the Friends of PHARMBIOTRAC Foundation

Where Vision and Innovation Converge

Welcome to a realm where aspirations soar and boundaries fade – the Friends of PHARMBIOTRAC Foundation. Step into a world where collaboration is not just a concept but a way of life, where every partnership is a catalyst for transformative change. Here, at the forefront of Pharm-Biotechnology and Traditional Medicine advancement in Africa, we weave a tapestry of ambition and excellence. Join us on this exhilarating journey as we unveil a vision that transcends borders, igniting minds and propelling progress toward a future brimming with promise and possibility. Welcome to a world where vision and innovation converge to shape a brighter tomorrow for all.

MISSION

"At the Friends of PHARMBIOTRAC Foundation (FPF), our mission is to catalyze transformative change in Pharm-Biotechnology and Traditional Medicine by fostering a culture of empowerment, innovation, and collaboration. Through strategic fundraising initiatives, we champion academic excellence by providing scholarships, fellowships, and exchange programs that empower students and faculty to thrive. We are dedicated to bridging the gap between aspiration and achievement, facilitating career development opportunities and internships that propel individuals toward national and international success.

VISION

The Friends of PHARMBIOTRAC Foundation's vision is a vibrant ecosystem where collaboration, innovation, and education thrive, driving transformative advancements in Pharm-Biotechnology and Traditional Medicine across Africa and beyond. Through strategic partnerships with corporations, research centers, universities, and philanthropists, we aspire to cultivate a dynamic network that empowers students, faculty, and researchers to harness cutting-edge technology and resources.



Top Leadership

of the entire PHARMBIOTRAC Program
on the following pages



Professor Celestino Obua Vice-Chancellor

**Friends of PHARMBIOTRAC
Foundation Board Chair**

Professor Celestino Obua (MD, MSc, PhD) is a Professor of Pharmacology and Therapeutics, a Fellow of the Uganda Academy of Sciences (FUNAS), and the current Vice Chancellor of Mbarara University of Science and Technology (MUST), Uganda. He lectured Pharmacology and Therapeutics at the Department of Pharmacology and Therapeutics, College of Health Sciences, Makerere University, for over 12 years before serving as the Deputy Principal, College of Health Sciences, Makerere University for four years, after which he was appointed as the Vice Chancellor of MUST to date. Prof Obua has a strong passion for research and capacity building at individual and institutional levels, yielding over 100 publications. He is the Principal Investigator/Program Director on several previous and current extramural research grants/projects at Mbarara University of Science and Technology.

[Online Profile: https://www.must.ac.ug/the-vice-chancellor/](https://www.must.ac.ug/the-vice-chancellor/)



Dr. Casim Umba Tolo
Director PHARMBIOTRAC
Friends of PHARMBIOTRAC
Foundation
Founding Board Member

Dr. Casim Umba Tolo is the Director of the Pharm-Biotechnology and Traditional Medicine Center (PHARMBIOTRAC) under the Eastern and Southern Africa Higher Education Centers of Excellence (ACE II) at Mbarara University of Science and Technology (MUST), Uganda. He has vast research experience and published articles in peer-reviewed journals and book chapters in areas ranging from Conservation Biology, Ecology, Environment, Natural Resources Management, Green Enterprises for Rural Development and Livelihoods, Climate Change Adaptation and Indigenous Knowledge Systems. His responsibilities, among others, include curriculum development, facilitating professional training, supervision of masters and PhD students, commissioned research/consultancy, and conducted community outreach.

Dr. Tolo gained broad experience through undertaking many collaborative research and consultancy work (e.g., Lake Victoria Research Initiative, VicRes, a SIDA-SAREC Program for East African Region) with regional and international colleagues in areas ranging from Climate Change Adaptation and Indigenous Knowledge Systems in Sustainable Agriculture, Climate Change Risks to Ecosystems and Biodiversity, Biodiversity Conservation Strategies in a Changing Climate, Primate Ecology and Conservation, Rangeland Ecology and Management, Human-Environment Interactions, Conservation and Management of Biological Resources, Solid Waste Disposal and Management. For example, he consulted with the Consultative Group.

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Dr. Casim Umba Tolo

for International Agricultural Research (CGIAR)/International Livestock Research Institute (ILRI), The Uganda National Commission for UNESCO (UNATCOM), The Inter-University Council for East Africa (IUCEA) and SNV-Netherlands Development Organisation. Dr. Tolo is a seasoned expert in project proposal development and project management. He has vast experience in successfully managing multi-millions of donor grants with excellent results. Currently, he is the local promoter of the Uganda component of “Action Towards Reducing Aquatic Snail-borne Parasitic Diseases (ATRAP located in Western Uganda. ATRAP is a joint initiative between MUST, Uganda, and the Royal Museum for Central Africa (RMCA), Tervuren, Belgium.

Dr. Tolo is serving/served on various boards and committees, among others: The National Committee of the Man and Biosphere (MAB) Programme, Uganda National Commission for UNESCO, Kampala-Uganda, The Board of Trustees of THETA-Uganda as a Chair Programmes and Research Committee, Director of Education and Environment of Anzoa Humanitarian Foundation Ltd, Adjumani, Uganda, Steering Committee on “Developing Herbal Alternatives to the Chemical Drugs used in the Dairy Sector, mainly concerning tick control, but also animal diseases such as mastitis” of the SNV-Netherlands Development Organisation, under The Inclusive Dairy Enterprise (TIDE) Project.

Further details of publications on [ORCID: https://orcid.org/0000-0003-1807-3438](https://orcid.org/0000-0003-1807-3438)

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**Associate Professor Robert
Tamukong; BSc, MSc,
Pharm.D, PHD**
Friends of
PHARMBIOTRAC
Foundation
Founding Board Member

Professor Tamukong is Associate Professor of Clinical Pharmacy Practice and Chair of postgraduate research and training in the Department of Pharmacy, Faculty of Medicine at Mbarara University of Science and Technology (MUST), Uganda, where he engages in teaching, research, supervision & examination of students, curriculum development, clinical practice, community engagement, administration, leadership, mentorship and consultancy in healthcare and academia. He also serves as program coordinator of the first-ever Master of Pharmacy in Clinical Pharmacy program in Uganda, which he conceived in 2017 and was accredited by the Uganda National Council of Higher Education in 2018. Prof Tamukong holds a Doctor of Pharmacy (Pharm.D) degree from the University of Minnesota in the USA and a PhD. His teaching, research, and practice interests are in the areas of pharmacy practice, clinical pharmacy/pharmacology, toxicology, pharmacotherapy, therapeutics, & pharmaceutical sciences, veterinary pharmacy, curriculum planning, design and implementation, pedagogy for healthcare professionals, pharmacovigilance & drug safety, antimicrobial stewardship, nutrition support for critical care patients, nosocomial-acquired infections, and other areas.

Before coming to Uganda, Professor Tamukong served as a clinical pharmacy specialist at the University of Minnesota Medical Center, Minneapolis in the USA, with teaching, research, and practice areas in emergency and critical care, internal medicine, pediatrics, surgery, oncology, obstetrics & gynecology, and psychiatry.

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Dr. Robert Tamukong

During his time at MUST, professor Tamukong has led the curriculum development and implementation of the first-ever Masters of Pharmacy in Clinical Pharmacy degree program in Uganda. He has provided mentorship and guidance to students and teaching staff and rendered Clinical Pharmacy Services to patients at the Mbarara Regional Referral Hospital.

Professor Tamukong is a highly motivated Academic with passionate, considerable, and extensive experience in teaching, clinical practice, and research. He has authored several peer-reviewed publications, book chapters, and poster presentations, including numerous invited lectures, workshops, and professional presentations nationally and globally. He has also completed several master's & PhD graduates and many sponsored projects, including various bilateral projects. He has a track record of working with different international institutions and universities worldwide. He is board-certified and licensed to practice in the USA, Minnesota, and Ohio. His research interests are centered on outcomes of critically ill patients related to drug therapy, specifically in the areas of pain, agitation and delirium, nosocomial-acquired infections, and antimicrobial stewardship.

His hobbies include cooking, reading, hiking, golfing, traveling, and the outdoors.

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Anke Weisheit Engineer

Friends of PHARMBIOTRAC
Foundation

Founding Board Member

Anke Weisheit is an Agricultural Engineer and holds a Master's degree in Agricultural Science and Resource Management in the Tropics and Subtropics (ARTS) with more than twenty years of experience in tropical agriculture, value chain development, and agri-business in Eastern and Southern Africa. She is the lead innovator and co-founder and currently serves as the Chair of Innovation and Business Management of the Pharm-Biotechnology and Traditional Medicine Center (PHARMBIOTRAC) at Mbarara University of Science and Technology, Uganda.

Anke is a co-founder and serves on the Friends of PHARMBIOTRAC Foundation (FPF) board. She has vast experience in innovation incubation, business mentoring, and product development, and she conducts project and proposal evaluations, strategic planning, feasibility studies, and organization development. Anke is also an External Expert to the European Commission Horizon 2020, a Member of the Governing Council of the Sub-Saharan Open University (SSOU), and serving on the WHO Regional Expert Advisory Committee on Traditional Medicine for COVID-19 Response (REACT). Anke had previously led teams for evaluations, need assessments, and feasibility studies. Previously, she served as a founding team member on the Board of Trustees of THETA Uganda as the Chairperson of the Programs and Research Committee and the Uganda Forum for Agricultural Advisory Services (UFAAS) board. She has researched and consulted for the United Nations Development Programme, World Bank, World Health Organization, World Agroforestry Center, and German Agency for International Cooperation, among others.

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About The Publisher

David J Dunworth (DJ) founded Marketing Mastery, a multi-disciplined marketing advisory services firm, and is the Publisher of Influence Magazine Today.

David is a Strategic Philanthropist, international best-selling author, and global speaker. Along with other special projects, Marketing Mastery works with select clients in the Medical, Dental, Legal, Wealth Advisory Services, and Wellness Practitioners. David serves on several international, national, and nonprofit boards of directors and spearheads a global humanitarian aid mission for impoverished populations.

Influence-Magazine. Today is a bi-monthly publication founded in 2023, and is quickly becoming a global concern, with subscribers in North and South America, Africa, and Asia.

To find out if Marketing Mastery is the right Growth Partner for your needs, feel free to reach out via email or leave a message on our 877 phone number and I will personally contact you. Information is below.



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