



**Academy of Scientific Research and Technology
Science and Technology Center (STC)**

أكاديمية البحث العلمي والتكنولوجيا

National Strategy for Genetic Engineering and Biotechnology

برنامج الاستراتيجية القومية للهندسة الوراثية والتكنولوجيا الحيوية

Application Form

Title of the Project:	Arabic: المرحلة الثالثة: إنشاء الشبكة القومية لحفظ وتداول المزارع الميكروبية المعنى بحفظ وتداول السلالات الميكروبية المرجعية وميكروبات الريزوسفير المحفزه لنمو النباتات وتلك المستخدمة في المقاومة الحيوية (المرحلة الثالثة: نحو الاعتراف العالمي والاعتماد الأكاديمي) English: Phase III: Conservation and handling of reference and standard microbial cultures collections, plant growth promoting rhizobacteria and bio control agents[Phase III: Towards Global Recognition and Academic Accreditation]		
Name of Applicant: <u>Principle investigator</u>	Prof.Dr. Enas Abd-Eltawab Hassan Elsaid أ.د. ايناس عبد التواب حسن السيد		
Affiliation of the applicant:	أستاذ الميكروبيولوجيا الزراعية - كلية الزراعة - جامعة عين شمس		
Requested Budget (LE):	ASRT Share: 4000000	Industry/Private Sector Share:	Total: 4000000
Duration of the project (months):	24 months		
Type of the project: (Please check one only)	Process Development <input checked="" type="checkbox"/>	Scaling Up <input type="checkbox"/>	Semi-industrial Production <input type="checkbox"/>
Approvals	Principal Investigator Name: Prof. Dr. Enas Abd- ElTawab Hassan Signature: Date:	Host Institution Name: Fac. Agric.,Ain Shams Univ. Title: The President of Ain Shams University Prof.Dr. Mohamed Daa Zain El-Abidin Signature: Date: Seal:	
Date of Submission			



Part A: Short CV of PI

1. Basic Information

Full Name in Arabic: أ.د. ايناس عبد التواب حسن	Full name in English: Prof.Dr. Enas Abd-Eltawab Hassan Elsaïd	
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Last University Degree Ph.D.	: Food Technology Inst. Moscow Ph.D. (Dept.agricultural Microbiology)	Graduation Date 1992
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Citations Number 365	Total no. of Publications: 53 مرفق السيرة الذاتية بنهاية الملف	
<u>Last recent Publications</u>		
Mostafa Fathi Abdelhai , Romisaa H. Shabaan , Noha M. Kamal , Esraa A. Elemary ,Basma T. Abd-Elhalim and <u>Enas A. Hassan</u>(2024). Copper nanoparticles biosynthesis by Stevia rebaudiana extract: biocompatibility and antimicrobial application. AMB Express 14:59		
Neima K. Al. Senosy , Noura El-Kattan , <u>Enas A. Hassan</u> , Hemmat M. Abd Elhady , Abdelkader Hazem ·Mona A. Ashour · Mosaad A. Abdel-Wahhab(2024).Therapeutic Role of Secondary Metabolites from Probiotic Strains for Ehrlich Solid Tumors in Mice. Current Microbiology (81):352		
Dina MS Hassan, Mohamed E El- Demerdash1, Yasmin MR Abdellatif, <u>Enas A Hassan</u> (2024). Isolation and Identification of Bacteria Producing Indole From Rhizospheric Plant. Arab Universities Journal of Agricultural Sciences, (2024) 32 (2) 1-5		
Alshimaa A. Atta-Allah, Rania F. Ahmed, Azza A. M. Shahin, <u>Enas A. Hassan</u>, Heba Abd-Alla El-Bialy1and Mohie Z. El-Fouly (2023). Optimizing the synthesis of yeast Beta - glucan via response surface methodology for nanotechnology		



application. BMC Microbiology. 23:110

Osama El-Sayed, Basma T. Abd-Elhalim, Mohamed A. Mosa & Enas A. Hassan (2025) .Characterization and optimization of biogenic copper nanoparticles synthesized by *Pseudomonas putida* with cytocompatibility investigation, Scientific Reports 15, Article number: 32504



Part B: Research Proposal

المرحلة الثالثة: إنشاء الشبكة القومية لحفظ وتداول المزارع الميكروبية المعنى بحفظ وتداول السلالات الميكروبية المرجعية وميكروبات الريزوسفير المحفزه لنمو النباتات وتلك المستخدمة فى المقاومة الحيوية (المرحلة الثالثة: نحو الاعتراف العالمي والاعتماد الأكاديمي)

Phase III: Conservation and handling of reference and standard microbial cultures collections, plant growth promoting rhizobacteria and bio control agents [**Phase III: Towards Global Recognition and Academic Accreditation**]

English Summary

Egypt has a vast and varied microbial riches that has enormous promise for a range of biotechnological uses in industries, agriculture, and medicine. The creation and development of strong Microbial Resource Centers (MRCs) are essential to efficiently use this priceless resource. Through the persistent efforts of the National Program for Genetic Engineering and Biotechnology-Academy of Scientific Research and Technology, the National Network for the Preservation and Exchange of Microbial Cultures, which consists of five main branches spread across five research institutions, has consolidated and established itself over the past ten years, accomplishing the majority of its goals. We must now finish this unique initiative with funds for a third phase in order to guarantee the continuity of funding across two phases. This is crucial to reach the ultimate goal of this network: establishing internationally recognized and interconnected Microbial Resource Centers (for microbial sustainability) in Egypt capable of comprehensive conservation, characterization, and distribution of microbial resources, thereby fostering national and international collaboration and innovation in the field of biotechnology. Therefore, this project aims to achieve the following specific objectives to build upon existing efforts to strengthen these centers, focusing on achieving international recognition, expanding their capabilities, and fostering collaborative networks. By enhancing the infrastructure, expertise, and scope of Egyptian MRCs, this initiative will contribute significantly to national scientific advancement and economic growth.

E M C C N holds 75 bacterial strains from different environments . These are provided to the researchers and investigators who wish to undertake large scale. Some strains have been deposited as general deposit which is accessible to public. The cultures are preserved in three different forms -80°C , liquid nitrogen and in lyophilized form. The cultures are supplied to the users either as lyophilized vial or as growing culture on the slant. It has expertise to handle all the groups of plant growth promoting bacteria. E M C C N also provides various services to institutes/universities and industries like supply of cultures, identification services,



Biochemical characterization, etc.) and educational services (workshops in colleges and universities, hands on trainings, etc.). In the future it is envisaged that it will be an independent entity that will serve the Research, industrial and agricultural fields for the characterization, authentication and long term preservation of precious microbial resources.

The third phase of the EMCCN project aims to elevate Egypt's microbial culture collection capabilities to meet international accreditation and academic recognition standards. This phase builds upon two previous stages in which over 75 bacterial and fungal strains were collected and preserved, and a central laboratory was established. In Phase III, 50 strains will be fully characterized, the network's operations standardized, and systems implemented to ensure long-term sustainability. Outputs will include an accredited microbial repository, integration with national academic curricula, expanded national collaboration, and inclusion in international culture collection networks. The outcomes of this phase are :

- Forming a trained research team.
- A dedicated laboratory for strain preservation was established, equipped with the capabilities to complete this work.
- Adding several multi-purpose microbial strains to the strain pool .
- Availability of microbial cultures using various preservation methods.
- Publication and awareness of the importance of this national project for preserving microbial wealth was conducted among interested parties.
- Training Programs: Implement specialized training programs for personnel working in the MRCs, commercial companies, manufacturers, and postgraduate and undergraduate students in Egypt and the MENA region focused on advanced techniques in microbial isolation, preservation, characterization (phenotypic and genotypic), and new data management programs.

Arabic Summary

مصر تمتلك ثروة ميكروبية واسعة ومتنوعة تُعد ذات إمكانات هائلة للتطبيق في مجالات متعددة مثل الصناعات والزراعة والطب. وإنشاء وتطوير مراكز موارد ميكروبية قوية (MRCs) يُعد أمرًا أساسيًا لاستغلال هذه الثروة الثمينة بكفاءة. من خلال الجهود المتواصلة للبرنامج القومي للهندسة الوراثية والتكنولوجيا الحيوية – أكاديمية البحث العلمي والتكنولوجيا، تم خلال العشر سنوات الماضية تأسيس الشبكة الوطنية لصون وتبادل المزارع الميكروبية، والتي تتكون من خمسة فروع رئيسية منتشرة في خمس مؤسسات بحثية، وقد نجحت في تحقيق الجزء الأكبر من أهدافها. وينبغي الآن استكمال هذه المبادرة الفريدة عبر تمويل المرحلة الثالثة لضمان استمرارية التمويل على مدى مرحلتين، وهو أمر ضروري لتحقيق الهدف النهائي للشبكة: إنشاء مراكز موارد ميكروبية مصرية معترف بها دوليًا ومرتبطة ببعضها، تُمكن من الحفاظ الشامل للموارد الميكروبية، والتوصيف والتوزيع، مما يعزز التعاون والابتكار على المستويين الوطني والدولي في مجال التكنولوجيا الحيوية. لذا، يُركز هذا المشروع على تحقيق الأهداف المحددة التالية، لبناء وتعزيز هذه المراكز القائمة، مع التركيز على الحصول على الاعتراف الدولي، وتوسيع القدرات، وبناء



شبكات تعاونية. من خلال تعزيز البنية التحتية والخبرات ومجال عمل مراكز الموارد الميكروبية المصرية، سئسهم هذه المبادرة بشكل كبير في التقدم العلمي الوطني والنمو الاقتصادي.

تدير EMCCN الشبكة المصرية للمزارع الميكروبية (مجموعة تضم 75 سلالة بكتيرية من بيئات مختلفة، تُقدم للباحثين والمحققين الراغبين في إجراء تجارب على نطاق واسع. بعض هذه السلالات مسجلة كودائع عامة متاحة لمن يريدها. تُحفظ المزارع بثلاث طرق: 80°C ، النيتروجين السائل، أو الصيغة المجففة بالتجميد (lyophilized). وتزود للمستخدمين إما في أنابيب مجففة lyophilized أو كمزرعة حية على آجار مائل. كما تمتلك EMCCN خبرة في التعامل مع جميع مجموعات البكتيريا المعززة لنمو النباتات، وتقدم خدمات متنوعة للمؤسسات الأكاديمية والصناعية مثل: توفير المزارع الميكروبية المخصصة لذلك ، وخدمات التعريف، والتوصيف البيوكيميائي، بالإضافة إلى خدمات تعليمية (ورش عمل ، وتدريب عملي). واستشرافاً للمستقبل، يُخطط لأن تصبح كياناً مستقلاً يخدم القطاعين البحثي والصناعي والزراعي في مجال التوصيف، والتوثيق، والحفظ طويل الأجل للثروات الميكروبية الثمينة.

المرحلة الثالثة من مشروع EMCCN تهدف إلى رفع قدرات مصر في مجال جمع الثقافات الميكروبية لتلبية المعايير الدولية للاعتماد والتميز الأكاديمي. هذه المرحلة تُبنى على مرحلتين سابقتين جمعاً وحفظاً أكثر من 75 سلالة بكتيرية وفطرية، وتم إنشاء مختبر مركزي. في المرحلة الثالثة، سيتم توصيف 50 سلالة بشكل كامل، وتوحيد إجراءات تشغيل الشبكة، وتنفيذ أنظمة لضمان الاستدامة طويلة الأجل. وتشمل المخرجات:

- تكوين فريق بحثي مدرب.
- إنشاء مختبر مخصص لحفظ السلالات مجهز بكافة الإمكانيات اللازمة.
- إضافة عدة سلالات ميكروبية متعددة الاستخدامات إلى مخزون السلالات.
- توفير المزارع الميكروبية باستخدام طرق حفظ متنوعة.
- نشر التوعية بأهمية هذا المشروع الوطني للحفاظ على الثروة الميكروبية بين المعنيين.
- تنفيذ برامج تدريبية متخصصة للكوادر العاملة في مراكز الموارد الميكروبية، والشركات التجارية، والمصنعين، وطلبة الدراسات العليا والبعالوريوس في مصر ومنطقة الشرق الأوسط وشمال إفريقيا، وتركز على تقنيات متقدمة في عزل الميكروبات، والحفظ، والتوصيف (الظاهري والجيني)، وبرامج إدارة البيانات الجديدة.

Keywords: Bacterial culture - biochemical examination – identification – preservation – molecular biology- lyophilized - liquid nitrogen



Implementing Team

	Name	Title	Organization	Jop description
1	Prof.Dr. Enas AbdEl Tawab Hassan	P.I.	Fac. Agruculture-Ain Shams –Univ.	Executive director of project implementation.
2	Prof.Dr. Mona S. Zayed	CO-PI	Fac. Agriculture-Ain Shams –Univ.	
3	Dr. Sodaf Ahmad Ahmad	Team member	Fac. Agriculture-Ain Shams –Univ.	Phenotype and biochemical Characterization, preservation, Culture checked for viability & purity
4	Dr. Wafaa hamdy Ali	Team member	Fac. Agriculture-Ain Shams –Univ.	
5	Dr. Samar El Refae Abdelsalam	Team member	Fac. Agriculture-Ain Shams –Univ	
6	Dr. Maha fawze Lotfe	Team member	Fac. Agriculture-Ain Shams –Univ	
7	Prof. Dr. Ramy karam Aziz	Team member	Faculty of Pharmacy, Cairo University, M.A.R.C.	Molecular Identification
8	Dr. Haitham shawky	Team member	National Research Centre	Accreditation Compliance (laboratory accreditation.)
9	D. Mona Abd Allh Ashor	Team member	Fac. Agriculture-Ain Shams –Univ	Phenotype and biochemical Characterization, Molecular Identification
10	Prof.Dr. Ahmed Elfateh	Team member	Agricultural Research Center	
11	Prof.Dr. Manal Farouk	Team member	Agricultural Research Center	
12	D. Nour Elhoda Hany Mohamed Eid	Team member	Fac. Agriculture-Ain Shams –Univ	Molecular Identification

Assisant team

	Name	Title	Organization	Jop description
1	Dina mondy sad	Team member	Fac. Agriculture-Ain Shams –Univ	Preparation of the media and reagent & recorded data
2	Mohamed Fahme Abd elmohassen	Team member	Fac. Agriculture-Ain Shams –Univ	
3	Ahmed Mohamed Saad	Team member	National Research Centre	Complete and activate the unified website
4	Sahar Atef Mahrous	Team member	Fac. Agriculture-Ain Shams –Univ	Writing reports and Enter the data
5	Dina reda Elsaid	Team member	Fac. Agriculture-Ain Shams –Univ	Lab. Technician
مطلوب عدد 2 عامل				

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الاسم : ا.د./محمد ضياء زين العابدين

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Introduction

Collections of microbial cultures are essential sources of microbial cultures. They serve as sources of microorganisms cited in scientific publications that can be utilized to validate results and for additional research, as well as repositories for microbial strains as part of patent deposits and confidential services to store important organisms for agriculture, industry, society, and research. Microbial culture collections are similar to libraries, except that they contain microorganisms rather than books. There are many cultural collections worldwide. These collections fall into one of two categories: tiny collections that supply strains or related services under special agreement, or national collections that offer broad services. Microorganisms are crucial for many ecosystems and provide numerous answers to global issues in the areas of food, the environment, poverty, and public health.

Microbial culture collections are institutions that isolate, preserve, characterize, and distribute microbial strains for research, industrial, medical, and agricultural use. As biodiversity hotspots, they play a pivotal role in conserving microbial resources, many of which are threatened by habitat destruction, climate change, and unsustainable agricultural practices.

➤ **Purpose and Importance of Culture Collections**

Culture collections serve several core functions:

- Preservation of microbial diversity, including rare, endangered, and endemic strains.
- Reference strains for taxonomic studies and microbial identification.
- Support for biotechnology, pharmaceuticals, and agriculture, including biofertilizers, biopesticides, and probiotics.
- Repositories for type strains required by international nomenclature codes.
- Resources for microbial ecology, genomics, and functional studies.

➤ **Major Culture Collections Around the World**

Some of the most prominent global culture collections include:

a. ATCC (American Type Culture Collection) – USA

- One of the oldest and largest culture collections globally.
- Houses over 18,000 bacterial and archaeal strains, as well as fungi, viruses, and cell lines.
- Renowned for standardizing microbial strains used in research and diagnostics.

b. DSMZ (German Collection of Microorganisms and Cell Cultures) – Germany



- Offers extensive microbial holdings, including bacteria, archaea, fungi, phages, and plasmids.
- Strong emphasis on genome sequencing, functional characterization, and patent deposits.

c. JCM (Japan Collection of Microorganisms) – Japan

- Focused on microorganisms from East Asia and marine environments.
- Involved in taxonomic research and international collaboration.

d. NBRC (NITE Biological Resource Center) – Japan

Maintains industrially important microorganisms and promotes biotechnological applications.

e. CCUG (Culture Collection University of Gothenburg) – Sweden

Specializes in clinical bacterial isolates, particularly antibiotic-resistant strains.

f. WFCC (World Federation for Culture Collections)

- Umbrella organization that supports a global network of culture collections.
- Encourages best practices, data sharing, and compliance with the Nagoya Protocol on access and benefit-sharing of genetic resources.

4. Culture Collections in Developing Countries

Developing regions, such as Africa, Latin America, and Asia, have established national and regional culture collections to conserve local microbial diversity:

COLMENA (Mexico) : Focuses on native soil and endophytic microorganisms for sustainable agriculture.

MTCC (India) : Supports Indian biotechnological industries and research institutes.

BCCM (Belgium) : A consortium of several collections focusing on fungi, bacteria, and yeasts.

The conservation of microbial resources is a strategic priority in modern biotechnology, agriculture, and environmental sustainability. Despite Egypt's rich microbial biodiversity, local microbial strains with high biotechnological value are often lost due to the absence of centralized, accredited systems for conservation, documentation, and distribution. So, the previous project phases (Phase I and Phase II) successfully established a core national network and microbial repository hosted at the Faculty of Agriculture, Ain Shams University.



With the evolving requirements for academic accreditation and international recognition, so the third phase of the project was needed , which aims to qualify the network for recognition from international organization (such as the WFCC) and accreditation from specialized academic institutes, thus enhancing Egypt's role as a regional leader in the field of microbial resource conservation.

However, to align with international standards and ensure sustainable use of these genetic resources, a third phase is necessary. This phase will aim for global recognition, international accreditation, and integration into academic and biotechnological platforms.

Ultimate Aim

To establish EMCCN as an internationally accredited and academically recognized microbial culture network that ensures the sustainable conservation, documentation, and utilization of Egyptian microbial biodiversity.

Specific Objectives

1. To fully characterize 30 bacterial isolates collected in previous phases using molecular, phenotypic, and functional tools.
2. To implement a Quality Management System (QMS) aligned with international accreditation standards.
3. To prepare the EMCCN for international registration with WFCC or WDCM.
4. To connect EMCCN to academic curricula and national postgraduate programs.
5. To expand the network's capacity through sustainable strategies and national collaboration.
6. To enhance visibility and accessibility through a digital platform with open access features.



Work Packages

A. Table of isolates to be Characterized

Strain Code	Genus/Species	Source	Type	Application
EMCCN 1183	<i>Bacillus sp.</i>	Dill roots	Endophyte	PGP & Biocontrol
EMCCN 1189	<i>Pseudomonas sp.</i>	Rhizosphere	PGPR	Biocontrol against <i>Fusarium</i>
EMCCN 1194	<i>Azotobacter sp.</i>	Sugar beet	Nitrogen fixer	Salt stress alleviation
EMCCN 1191	<i>Pseudomonas sp.</i>	Maize rhizosphere	PGPR	Growth enhancement
EMCCN 1184	<i>Bacillus sp.</i>	Aquaponics	PGPR	Organic aquaculture support
EMCCN 1015	<i>Rhizobium sp.</i>	rhizosphere	PGPR	Growth enhancement
EMCCN 1026	<i>Bacillus</i>	rhizosphere	PGPR	Growth enhancement
EMCCN 1026	<i>Bacillus</i>	rhizosphere	PGPR	Growth enhancement
EMCCN 1041	<i>Azotobacter</i>	rhizosphere	PGPR	Growth enhancement
EMCCN 1022	<i>Rhizobium</i>	rhizosphere	PGPR	Growth enhancement
EMCCN 1096	<i>Bacillus</i>	rhizosphere	PGPR	Growth enhancement
EMCCN 1066	<i>Pseudomonas sp.</i>	rhizosphere	PGPR	Growth enhancement
EMCCN 1068	<i>Serratia</i>	rhizosphere	PGPR	Growth enhancement
EMCCN 1044	<i>Bradyrhizobium</i>	rhizosphere	PGPR	Growth enhancement
EMCCN 1012	<i>Rhizobium</i>	rhizosphere	PGPR	Growth enhancement



Approach Towards Internationalization

- Registration with World Data Centre for Microorganisms .
- Preparation of SOPs aligned with WFCC guidelines.
- Staff training on international biosecurity and biosafety protocols.
- Initiate collaboration with International Microbial Organizations to gain formal affiliation and active participation through engagement in their activities, acquiring best practices, collaborative opportunities, and advancements in global science.
- Develop a National Microbial Database and online catalog that details MRC resources to facilitate the global dissemination of the MRCs, promote collaboration, and reduce redundancy.
- Develop a cooperation agreement with the International Microbial Organizations to exchange workshops, seminars, and educational resources.
- Create a multilingual online platform to promote the network's activities.
- **Build partnerships with accredited international culture collections:**

Collaborate with globally recognized centers for technical support and benchmarking.: Communication has begun by emails with international microbial centers(China general microbiological culture collection center (CGMCC) & NCIM in India) to exchange of expertise in this field and the transfer of modern technologies. **(attached 2 emails)**.

Accreditation Objectives

- Biobanking and related services.
- WFCC endorsement and membership.
- National academic accreditation as a certified training and research center.
- Partnership with accredited international repositories.
- Achieving national accreditation by developing standardized protocols and quality management systems within MRCs to meet the criteria for national and international accreditation.

Sustainability Strategy



Item	Strategy
Human Resources	Training postgraduate students and technicians as part of the EMCCN team
Financial Sustainability	Offer paid services (e.g., strain authentication, training workshops)
Institutional Support	Engage universities, and research centers as stakeholders
Digital Infrastructure	Build an open-access online platform with digital strain catalog

➤ **The service at EMCCN for researchers and stakeholders :**

1. Deposit of culture
2. Identification service
3. Culture supply
4. Certificate of deposit for Microbial Strain for researchers to publish in international journals
5. Isolation of bacteria
6. Developing training programs:
 Training Programs: Implement specialized training programs for personnel working in the MRCs, commercial companies, manufacturers, and postgraduate and undergraduate students in Egypt and the MENA region focused on advanced techniques in microbial isolation, preservation, characterization (phenotypic and genotypic), and new data management programs.

These services will be operated as follows:

1. Deposit of cultures :

These are deposit as general deposit or patent Deposit .After it was received the processing for the deposit are as follow :

- a. assessment the viability and purity
- b. authenticity sequencing
- c. Preservation :
- d. Depositor's confirmation
- e. Release the accession no.

2. Identification services as follow:

- a. Sequencing (16SrRNA gene & full genome) if available fund
- b. Biochemical test

3. Culture supply



- a. Receipt of order request & fee
- b. Culture checked for viability & purity
- c. Delivery for the customer
- d. Feedback from the customer

Detailed Methods

1. Isolate Processing & Pure Culture Isolation

- Begin with isolates collected in Phases I & II.
- Perform streak plating on selective and differential solid media to obtain pure cultures through quadrant streaking to ensure its purity
- Inspect colony morphology, pigmentation, size, elevation, Gram staining, and spore presence for phenotypic characterization .

2. Perform the biochemical testes

3. Molecular Identification

Extract genomic DNA using validated commercial kits.

- Amplify and sequence:
 - 16S rRNA gene for bacteria
- Perform sequence alignment and barcode assignment, comparing to public databases (e.g., GenBank).

3. Examine the availability of the bacterial cultures

4. Preservation and Long-Term Storage

- Utilize facilities from Phases I & II (e.g., lyophilizer, LN₂ system, -80 °C freezers).
- Storage protocols:
 - Cryopreservation at -80 °C or in Liquid Nitrogen
 - Freeze-drying (lyophilization) for long-term stability
- Use cryoprotectants (e.g. glycerol, skim milk) and controlled inoculum densities to maintain viability above 80–90%.

5. Quality Management System (QMS) & Accreditation Compliance

- Validate and verify all critical processes, equipment, and workflows to ensure fitness-for-purpose .

6. Traceability, Accessioning & Barcode System Integration

- Assign unique accession numbers to each strain, linked to metadata: origin, date, genus/species, functional data, storage details.
- Design and apply barcode labels on vials/tubes compatible with cryogenic storage.
- Implement barcode scanners connected to the LIMS (Laboratory Information Management System) or the new digital platform.
- At key stages (accessioning, sampling, distribution), scan barcodes to automatically log chain-of-custody and movement events.

7. Validation, Training & Competency Assessment

- Conduct validation trials for each method (e.g. repeatability, reproducibility of assays).



- Deliver training workshops for technical staff on:
 - SOPs for isolate handling.
 - Molecular and functional assays.
 - Barcode scanning and data entry procedures.
 - Platform operation and maintenance.
- Perform competency assessments and internal audits regularly before external accreditation review.

➤ **Genomic Characterization:**

Whole genome sequencing (WGS) is a powerful approach for characterizing bacterial genomes, enabling the identification of genes related to antibiotic resistance, secondary metabolites, environmental resilience, and biotechnological functions. It was performed WGS of 3 bacterial strains, which has demonstrated promising traits such as [e.g., plant growth promotion, antimicrobial activity, biodegradation].

Genomic analysis will provide insights into the strain's metabolic potential and stress adaptation mechanisms. The data will support further development of microbial bioformulations or genetic engineering applications.

Objectives

- To extract high-quality genomic DNA from *bacterial culture*.
- To perform whole genome sequencing using the Illumina [or Nanopore/PacBio] platform.
- To assemble, annotate, and analyze bacterial genomes.
- To identify the important traits.
- To perform phylogenetic analysis among sequenced isolates.

Materials and Methods

- **Bacterial Isolate and Cultivation**
- **Genomic DNA Extraction**

Method:

- CTAB-based protocol or commercial kit (e.g., Qiagen DNeasy Blood & Tissue Kit)
- **Quality Control:**
 - NanoDrop spectrophotometry (A260/A280, A260/A230)
 - Qubit fluorometry for concentration
 - Agarose gel electrophoresis for integrity



Whole Genome Sequencing

- **Platform:**
 - Short-read sequencing: Illumina MiSeq/NextSeq (paired-end, 150 bp)
 - Long-read sequencing (optional): Oxford Nanopore MinION or PacBio Sequel
- **Library Preparation:**
 - Nextera XT (Illumina) or Rapid Barcoding Kit (Nanopore)
- **Quality Control:**
 - Bioanalyzer or TapeStation for fragment size distribution
 - Quantification via Qubit

Genome Assembly

- **Short-read data:** SPAdes / Velvet assembler
- **Long-read data:** Canu / Flye
- **Hybrid assembly:** Unicycler (if using both types)
- **Assembly QC:**
 - QUILT for contig metrics
 - CheckM for completeness and contamination

Genome Annotation

- **Tool:** Prokka / RAST / NCBI PGAP
- **Output:** Gene annotations, rRNAs, tRNAs, coding sequences (CDS), hypothetical proteins

Functional and Comparative Genomics

- **Databases Used:** KEGG, COG, Pfam, CARD (for antibiotic resistance), AntiSMASH (for secondary metabolites)
- **Phylogenetic Analysis:** Using 16S rRNA or core genome alignment via tools like MEGA, PhyloPhlAn
- **Pan-genome Analysis (optional):** Using Roary or BPGA
- **Pathway Analysis:** Using BlastKOALA or EggNOG
- **Phylogenetic Analysis:**
 - Core genome alignment with **Roary** or **Panaroo**.
 - Tree construction using **IQ-TREE** or **RAxML**.
 - Visualization with **iTOL**.

Data Storage and Submission

- All sequence data will be submitted to public repositories such as NCBI Sequence Read Archive (SRA).
- Metadata will be documented using MIxS standards.



Expected Outcomes

- High-quality draft or complete genome sequence
- Identification of genes related to [e.g., nitrogen fixation, IAA production, degradation pathways]
- Phylogenetic position and relationship with closely related species
- Genomic data to support potential patent or functional development

➤ Available Equipment from Previous Phases

Equipment	Status
Lyophilizer	Functional
Liquid Nitrogen Storage System	Functional
Spectrophotometer	Available
Shaking Incubator	Functional
Laminar Flow Cabinet	Available
Light Microscope	Functional

Required Maintenance

The maintenance program includes several critical, high-precision activities aimed at preserving laboratory performance and ensuring compliance. First, **calibration and servicing of the lyophilizer and cryo-systems** involve a detailed, scheduled approach: temperature sensors and pressure gauges must be calibrated against. Best practices call for “zeroing” iterations monthly, followed by full calibration every 2–3 months for units subjected to steam sterilization, with dry or isolated systems extending intervals based on performance history and usage. Technicians should record at least six calibration points across the operating range (10 %, 20 %, ... 100 %) to ensure accuracy under all lyophilization cycle conditions. The liquid nitrogen was needed continuously. Second, **replacement of HEPA filters in biosafety cabinets** is recommended every 3–5 years in many labs, or as soon as performance metrics fall below specification. Key indicators include reduced airflow, elevated pressure differential, and a rise in particle counts within the work zone. The replacement process includes cabinet decontamination (using VHP or other validated agents), careful filter removal and installation following a sealed procedure, and post-installation airflow and leak integrity testing. Finally, **software upgrades for the strain database and barcoding system** are vital for accurate sample tracking and data reliability. These upgrades generally involve backing up existing data, installing vendor-approved updates, verifying system integration with inventory and tracking hardware, and conducting validation tests to confirm scanning, label generation, and database consistency. This ensures minimal disruption, improved accuracy in strain identification, and enhanced laboratory data management.



Required Consumables and Supplies

- DNA extraction kits
- PCR reagents and primers
- Growth media and buffers
- Sterile vials, cryotubes, and storage boxes
- Activating an electronic tracking system for samples (Barcode & Tracking system).
- Protective equipment and disinfectants
- Liquid nitrogen

Required Equipment

Item	Justification
Barcode Scanner and Printer	For tracking and inventory management
Microplate Reader	For rapid biochemical analysis
Autoclave	For sterilization of tools
Two Computer and printer	Data recording
Freezer Refrigerator -80C°	For Sample Storage



بنود الموازنة المقترحة بالجنيه المصرى



خطة العمل خلال فترة المشروع (عمان)

Task No.	Task Title	Duration (Months)	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14	M15	M16	M17	M18	M19	M20	M21	M22	M23	M24
1	Achieving national accreditation	14	X	X	X	X	X	X	X	X	X	X	X	X	X	X										
2	collaboration with International Microbial Organization	12							X	X	X	X	X	X	X	X	X	X	X	X						
3	Develop a National Microbial Database and online catalog	12	X	X	X	X	X	X	X	X	X	X	X	X												
4	Implement specialized training programs for personnel working in the MRCs, commercial companies, manufacturers, and postgraduate and undergraduate students in Egypt and the MENA region	6																X	X	X	X	X	X	X	X	X
5	Molecular & Functional Characterization					X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
6	SOP Development							X	X	X	X	X	X	X	X	X	X	X	X							
7	Workshops and Academic Integration										X	X	X	X	X	X	X	X	X	X	X	X	X	X		
8	Culture preservation							X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Project Outcomes:

1. Officially accredited MRCs under international guidelines.
- 2- National recognition as a compliant and high-standard microbial repository.
- 3- Greater trust from academic, industrial, and governmental users.
- 4- Enhanced global visibility and collaborations.
- 5- Industrial applications and partnerships leading to economic benefits.
- 6- Preservation of Egypt's microbial biodiversity for future generations.
- 7- Qualified EMCCN Phase III Team
- 8- Complete strain profiles
- 9- Operational SOPs in place
- 10- Online database and barcode tracking
- 11- Files ready for WFCC submission

مرفق السيرة الذاتية للباحث الرئيسى

Read / Unread

n invitation to communicate and exchange experiences

NCIM office
Dear Sir/Madam, Thank you for your query. We have stopped supply of cultures outs... Mon 5/5/2025 1:24 PM

Enas El Sayed
To: ncim@nd.res.in Mon 5/5/2025 1:43 AM

Dr. Homi Bhabha Road,
Best regards. I am honored to cooperate with your organization, the National Collection of Industrial Microorganisms (NCIM), to exchange experiences and transfer technology in the field of conservation and Handling of microbial cultures. We are members of one of the national projects in the Arab Republic of Egypt under the title "**National Network for Conservation and Handling of Microbial Cultures.**", funded by the Academy Of Scientific Research & Technology, which includes many microbial strains with multiple applied uses. A number of research and academic centers are presented in this project to support the field of research and application on the scale of industry and agriculture. Therefore, we kindly request your acceptance of our cooperation to transfer scientific cultures and practical experiences

Please reply for this mail
Thank you

Prof. Dr. Enas A. Hassan
Head of the Department of Agricultural Microbiology
Ain Shams University

Ask AI Assistant



