Granti Form
Microbiology Course (MICR201)

Title of the Project:	Microbial Synthesis of Fibers from Salt Marshes	
Name of Applicant:	Hana Hisham Saad, Hams Ahmed Hassan, Basant Taha, Nancy Shehta Bahi, Saria Mohamed Abdelmoniem	
Field of Specialization:	Hybrid (Environmental + Medical)	
Affiliation:	Nile University	
Total Requested Budget:	2,830,000	
Industrial partner cost-sharing (If any)	2,050,000	
Industrial partner`s name (If any):	Dice Textiles, El Nasr Salines, PIL MI & Africa Medical Bandage Manufacturer	
Duration: (Up to Three years):	24 months	
Project Area (*Please check only one*) ☐Materials applications ☐Food security and farming technologies ☐Energy production, storage, and management ☐Computer Science ☐Information and Communication Technologies ☐Water treatment, resources, and usage management ☒Environment and eco-systems sustainability ☐Medicine and Pharmaceuticals ☐Biomedical Engineering		
Sub. Area:		
Approvals	**Principal Investigator** Name: Hana Hisham Signature: Date:	**Host Institution** Institution President Name: Signature: Date: Stamp:
Date of Submission: 6/12/2025		

Research Team – Annex 1

No	Name	Role in the Project	Contact Information (Tel., Email)	NID الرقم القومي
1	Hana Hisham Saad	PI	01096640350	30404308800707
2	Hams Ahmed Hassan	Team member	01006119178	30609300106144
3	Basant Taha	Team member	01015355550	30612100101289
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The Research Proposal

1. English Abstract (one page maximum)

The proposed project aims to create a sustainable, completely biodegradable and low costing textile-grade fibers. In which, it would be turned into sterile gauze. The fibers are produced by leveraging the metabolic capabilities of halotolerant microorganisms sourced from Egyptian water purification stations and adjacent salt marshes. Salt marshes are highly productive habitats where those plants dominant. The plants introduce a major problem, as it obstructs the salt marshes from doing their job properly. The project will utilize the by-product from metabolism and by recombinant DNA cause the bacteria to produce vast quantities of lignocellulosic biomass into the environment. The goal is to select the microbial strains have the efficiency in contaminant degradation (organic carbon, nitrates, and phosphates) and their ability to secrete abundant cellulolytic enzymes. The primary objective is to use this highly efficient, purified microbial isolate to perform a low-chemical, energy-efficient bio-extraction of cellulose fibers from two abundant Egyptian halophytic plants: Salicornia europaea and Atriplex halimus. The bacterial enzymes will naturally degrade lignin and hemicellulose to liberate the fibers. The resultant fibers will be fully characterized by FTIR, SEM, and Tensile testing , processed into nonwoven sheets , and subjected to extensive biomedical evaluation, including MTT cytotoxicity assays for biocompatibility, absorbency, and biodegradability. This project is poised to deliver a circular economy solution, generating a sustainable, biomedical-grade material while simultaneously contributing to water purification.

2. Arabic Abstract (one page maximum)

يهدف هذا المشروع المقترح إلى إنتاج ألياف نسيجية قابلة للتحلل الحيوي بالكامل ومنخفضة التكلفة يمكن تحويلها لاحقًا إلى شاش طبي معقّم صالح للاستخدامات الطبية .

تعتمد فكرة المشروع على استغلال القدرات الأيضية للميكروبات المتحمّلة للملوحة والتي سيتم عزلها من محطات تنقية المياه المصرية والمسطحات الملحية المجاورة،و تُعدّ المستنقعات الملحية موائل شديدة الإنتاجية، إلا أن النباتات المسيطرة عليها تمثل مشكلة رئيسية لأنها تعيق قدرتها الطبيعية على تأدية وظيفتها البيئية.

سيستخدم المشروع النواتج الثانوية لعمليات الأيض، ومع التعديل الوراثي بتقنية *DNA recombinant* ستُحفَّز البكتيريا لإنتاج كميات كبيرة من الكتلة اللجنوسليلوزية في البيئة .

و يركز المشروع على اختيار السلالات الميكروبية الأكثر كفاءة في إزالة الملوثات مثل الكربون العضوي والنيترات والفوسفات، بالإضافة إلى قدرتها العالية على إفراز الإنزيمات السليلوزية.

كما ان الهدف الرئيسي من هذا البحث هو استخدام العزل الميكروبي الفعّال والمنقّى لإجراء عملية استخلاص حيوي منخفضة الكيميائيات وموفرة للطاقة لاستخراج السليلوز من نباتين ملحيين متوافرين بكثرة في مصر *Salicornia europaea* :و *Atriplex halimus.*ستقوم الإنزيمات البكتيرية بشكل طبيعي بتكسير اللجنين والهيميسليلوز لتحرير الألياف.

بعد ذلك سيتم توصيف الألياف ٠الناتجة باستخدام تقنيات *(FTIR)* و *(SEM)*واختبارات الشد، ثم معالجتها لإنتاج طبقات غير منسوجة، يلي ذلك تقييم بيولوجي طبي شامل يتضمن اختبار السمية الخلوية*(MTT)* ، والامتصاصية، وقابلية التحلل الحيوي.

يُتوقع أن يقدم هذا المشروع نموذجًا اقتصادياً دائريًا متكاملاً، ينتج مادة طبية مستدامة عالية الجودة، وفي الوقت ذاته يساهم في تحسين جودة المياه وتنقيتها.

3. Introduction/Background (two pages maximum)

In recent years, the global shift toward sustainability has driven increasing interest in developing environmentally friendly alternatives to conventional synthetic materials. Synthetic fibers and plastics represent a major environmental burden due to their non-biodegradability, contribution to greenhouse gas emissions during production, and release of microplastics that accumulate in soil, water systems, and even human tissues. These pollutants are linked to respiratory, neurological, and blood-related health complications, emphasizing the need for safer green substitutes.

Among sustainable solutions, natural plant-based fibers have gained significant attention due to their biodegradability, abundance, and compatibility with textile and biomedical applications. Fibers such as flax, jute, hemp, and halophytic species offer promising mechanical properties and biocompatibility, positioning them as suitable candidates for industrial processing and medical use. However, despite their environmental advantages, most extraction methods still depend on harsh chemical retting or energy-intensive mechanical processing, resulting in high production costs, chemical waste, and low sustainability contradicting the purpose of adopting green fibers(chen et al.,2023).

To overcome these limitations, microbial biotechnology has emerged as an innovative strategy for fiber extraction. Through microbial or enzymatic retting, plant tissues can be degraded biologically using bacteria-secreted enzymes such as pectinases, cellulases, and hemicellulases. This process selectively removes non-cellulosic material, separating fibers without toxic chemicals, reducing energy consumption, and improving fiber quality. Recombinant DNA technology further enhances this process by enabling engineered bacterial strains to overproduce targeted enzymes, increasing efficiency and making large-scale applications more economically feasible (Fu et al., 2024; Amorim et al., 2023).

This approach is particularly relevant in Egypt, where water scarcity represents one of the most critical environmental challenges. Water availability has significantly declined, with agriculture

consuming more than 60% of freshwater resources, leaving limited supply for industrial and domestic use (UNICEF, 2021). To address this, the government has invested in purification and desalination plants, establishing more than 90 new treatment facilities between 2020 and 2024, with additional expansions ongoing. Integrating microbial fiber-extraction systems within or near these treatment plants offers a dual benefit supporting water reuse while valorizing local halophyte biomass that naturally grows in saline environments surrounding desalination sites.

Halophytic plants provide an untapped resource for fiber production, as they thrive in salt-rich conditions unsuitable for traditional crops. Using bacteria to convert halophytic residues into usable fibers presents a sustainable opportunity to generate value from underutilized plant waste. Extracted fibers can later be processed into textiles or enhanced into biomedical materials. Notably, microbial-derived cellulose and plant-fiber composites are already investigated as wound dressings due to their biocompatibility, sterility, and high absorption capacity, making them suitable for gauze development and medical use (Horue, 2023; Garcia-Caparros, 2023).

Therefore, this research aims to isolate and develop bacteria from water purification plants capable of enzymatically degrading halophytic plant tissue to synthesize eco-friendly fibers as seen in figure 1. The produced fibers will be woven into textile samples and evaluated for biomedical suitability, particularly for wound dressing applications. This innovation reduces chemical pollution, supports sustainable textile production, and aligns with Egypt's national goals for environmental sustainability and healthcare advancement.

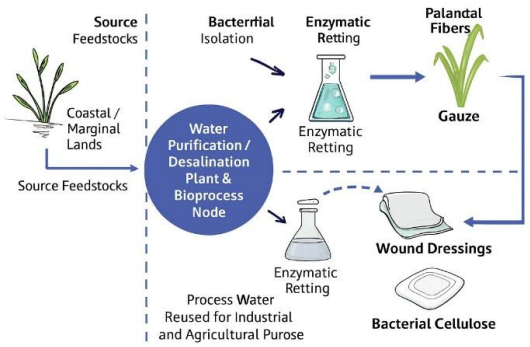

Figure (1)

4. Objectives (one page maximum)

1. Pollution Removal and Water Purification: The goal is to figure out how well the salt marsh system can clean water by taking out pollution and contaminants.
2. Material Applications for the Extracted Fibers: We need to test the new fibers we make to see what high-value products they can be used for (like special textiles or biomedical materials).
3. Sustainability and Cost–Benefit Assessment: We will check if the project is environmentally friendly in the long run and compare the cost of our process to the value of the products we create.
4. Eco-friendly Wastewater Treatment using Salt Marshes: The plan is to design a natural, low-impact system that uses the salt marsh plants to clean dirty water.
5. Utilization of Halophytic Grasses for Natural Fiber Production: We aim to use the salt-loving marsh grasses as a reliable, renewable source for making the new natural fibers.
6. Isolation of Beneficial Microorganisms for Bioremediation and Fiber Biosynthesis: We will find and study helpful microbes from the marsh that can do two jobs: clean up toxins and help make the fiber material.
7. Integration of Water Purification with Biomass Valorization to Support a Circular Bioeconomy Model: The final step is to connect the water cleaning system with the fiber-making process to create a complete, self-sustaining "circular" production model where waste is minimized.

5. Industrial Partner (if any) (two pages maximum)

Dice Textiles:

- Description and Experience: Dice Textiles is an EGX-listed, vertically integrated apparel and ready-made garments manufacturer, with a strong presence in both the local and global export markets. The company operates a comprehensive value chain, including knitting, sewing, dyeing, and printing. Crucially, Dice has stated a commitment to sustainability, technological strength, and developing innovative, environmentally friendly products, which aligns directly with the goal of creating a bio-derived, sustainable fiber.
- Role in Project: Consultation & Mechanical Validation: Dice will provide expertise in the requirements for industrial spinning and weaving. They will consult on the fiber characterization results (Tensile Strength Test, SEM) to ensure the bio-extracted fiber meets textile processing standards.
- Mutual Benefits: De-risking the Supply Chain: Dice gains access to a novel, sustainable, and domestically sourced textile feedstock (cellulose fiber from halophytes), reducing reliance on imported materials and enhancing their reputation in the global market for eco-friendly manufacturing.
- Contact Information: seif.toma@dicefactory.net

El Nasr Salines:

- Description and Experience: Established in 1805, El Nasr Salines is one of the largest salt companies in the Middle East and Africa, fully owned by the Egyptian government. They specialize in the design, implementation, and operation of solar salines and manage vast, naturally clean salt marsh areas. Their core expertise is in high-salinity environments, making them uniquely positioned to support a halotolerant biotechnology project.

- Role in Project: Site Access & Logistics: El Nasr Salines will grant controlled access to their saline water collection sites and salt marshes for the collection of halophytic plants (Salicornia, Atriplex) and halotolerant microbial strains (WP 1 & 3). They will also assist with logistical challenges of bulk biomass acquisition.
- Mutual Benefits: Bioremediation Insight & Resource Valorization: El Nasr gains preliminary data and expertise on utilizing indigenous halotolerant microbes for bioremediation (wastewater contaminant reduction). They also see the commercial potential of valorizing the native halophytes that grow abundantly on their land, turning them into a high-value resource.
- Contact Information: headoffice@nasrsalines.com, +20 3 4837492, +20 3 4837493,+20 3 4837626

PIL MI & Africa Medical Bandage Manufacturer:

- Description and Experience: A leading Egyptian manufacturer of medical consumables since 1984 (as Afri Medical), specializing in wound-care and surgical dressings. The company operates large facilities (9,000 m^2) with an in-house testing laboratory and sterilization facility, adheres to strict quality standards (e.g., ISO 13485:2016 for Medical Devices), and exports globally.
- Role in Project: Final Application Fabrication & Quality Assurance: The company will use their industrial processes to convert the refined cellulose fibers into sterile medical-grade gauze prototypes. They will assist in testing crucial properties like Absorbency and Mechanical Strength.
- Mutual Benefits: Product Innovation & Differentiation: The partner gains a non-toxic, non-allergenic, and sustainable alternative to traditional cotton/synthetic fibers for wound care products. This differentiation allows them to target growing markets demanding eco-friendly, high-performance medical textiles.
- Contact Information: +201200183333

6. Project Description, Methodology, Key References and International Collaboration (if any) (nine pages maximum)

Phase I: Bioremediation and Microbial Isolation

1. Sample Collection: Obtain saline wastewater and biofilms from Egyptian water purification stations and adjacent salt marshes.
2. Serial Dilution and Plating: Serially dilute the samples (10^{-1} to 10^{-6}) and plate them on nutrient agar and selective media (e.g., Bushnell–Haas agar supplemented with hydrocarbons or lignocellulosic substrates).
3. Incubation and Purification: Incubate plates at 30°C for 24–48 hours. Select and purify distinct bacterial colonies via repeated streaking.
4. Contaminant Degradation Screening: Screen the isolates for their ability to degrade contaminants (organic carbon, nitrates, and phosphates) in synthetic wastewater.
5. Efficiency Determination: Determine the contaminant removal efficiency using spectrophotometric analysis (e.g., COD, nitrate reduction, phosphate removal).
6. Biomass Production Screening: Evaluate isolates for extracellular lignocellulosic biomass production under saline conditions.

Phase II: Characterization and Optimization of Bacterial Strains

1. Phenotypic Characterization: Subject every isolate to Gram staining, morphological assessment, and biochemical characterization (oxidase, catalase, urease).
2. Taxonomic Identification: Identify selected organisms precisely by sequencing the 16S rRNA gene.
3. Growth Optimization: Conduct experiments to optimize growth conditions, varying Temperature (25-40°C), pH (6.0-9.0), and Salinity (1-10% NaCl).
4. Enzymatic Activity Assay: Measure the enzymatic activity (e.g., cellulase activity using the DNS method) from bacterial extracts using colorimetric assays to determine the isolate with the best yield.

5. Strain Selection/Engineering: Select the isolate with the highest enzyme activity and pollutant removal capability for the fiber degradation trials. Optionally, employ recombinant DNA engineering to clone cellulase or ligninase genes into high-yield expression vectors to improve enzyme yield.

Phase III: Fiber Extraction from Halophytic Plants

1. Plant Material Acquisition: Obtain halophytic plants, specifically Salicornia europaea and Atriplex halimus, from northern Egyptian salt marshes.
2. Pre-Treatment: Rinse the plant residues (stems and roots) to remove salt, dry at 40°C for 48 hours, and grind into small pieces (2-5 mm particle size).
3. Bacterial Treatment (Fermentation): Add the pre-treated biomass (10 g/L) to a minimal salt medium with the selected bacterial inoculum (5% v/v). Incubate for 5-7 days at 30°C with mild shaking (150 rpm).
    - The bacterial enzymes will degrade lignin and hemicellulose, liberating cellulose fibers.
4. Fiber Purification: Filter the resulting fibers, rinse extensively with distilled water, and air dry.
5. Fiber Characterization: Analyze the purified fibers:
    - Fourier Transform Infrared Spectroscopy (FTIR): To quantify cellulose peaks.
    - Scanning Electron Microscopy (SEM): For high-resolution analysis of fiber surface morphology.
    - Tensile Strength Test: For assessments of mechanical integrity.

Application Development: Utilize the resulting fibers to be woven into usable textiles and treated for biomedical purposes (e.g., wound dressings/gauze).

Reference

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7. Expected Project Outcomes (two pages maximum)

Firstly, it is expected that the project will show that nature-based plant systems can detoxify polluted water without needing chemical additives. These systems will detoxify through the removal of heavy metals, salts, and organic pollutants and create cleaner, reusable water, while protecting long-term environmental health.

Secondly, it is expected that this proposed study will show that the salt marsh ecosystem is a more eco-friendly, cost-effective solution to wastewater treatment. Pollution is naturally degraded through the cooperative efforts of halophytic plants and soil microorganisms. This will show the ability to lower long-term operational costs, continue to support biodiversity, and provide a sustainable alternative to standard treatment technologies.

Thirdly, we expect the halophytic grasses to validate the potential of salt-tolerant plants as natural fibers. Because they can adapt to saline and arid lands where other crops are not viable, we expect the project to show that these grasses can contribute to the conditions for converting unproductive land into valuable biomass.

Fourthly, we expect the extracted natural fibers to demonstrate useful properties for applications as materials; potential uses may include textiles, biodegradable packaging, ropes, and reinforcement materials. These applications could in part aid the reduction of synthetics and the transition to bio-based materials.

Fifthly, we anticipate that by linking wastewater treatment to biomass valorization, development of sustainable material, and circular bioeconomy, the project will demonstrate a model for circularity. The demonstration of a nature-based circularity will deliver multiple outcomes, including water purification, biomass production, and sustainable product development, which could provide scalable, sustainable alternative to address future environmental challenges.

8. Budget Justification (two pages maximum)

I. Incentives (Personnel Costs)	Name	Cost (EGP/Year)	Role in Project
	Hana Hisham	2,000	Compensation for the team's technical expertise in Phases I, II, and III (Bioremediation, Strain Optimization, and Fiber Bio-Extraction).
	Hams Ahmed Hassan	2,000	
	Basant Taha	2,000	
	Nancy Shehta Bahi	2,000	
	Saria Mohamed Abdelmoniem	2,000	
Total		20,000	

II. Equipment Name	Purpose in Project	Cost (EGP)	Detailed Justification
Pilot-Scale Fermentation Reactor (50-100 L)	Used to scale up the Bacterial Treatment (fermentation) of halophyte biomass (10 g/L).	400,000	Essential for industrial translation. This scale is necessary to produce sufficient cellulose fiber yield to enable prototype fabrication by Dice Textiles and Africa Medical Bandage Manufacturer (Phase III).
Microplate Reader	Used for high-throughput colorimetric assays (e.g., DNS method for cellulase activity) and large-scale contaminant degradation screening (Phase I).	150,000	Enables rapid ,accurate ,and high-throughput quantification of the best enzyme-producing strain (Phase II), which is superior to the available basic spectrophotometer.
TOC Analyzer (High-End Spectrophotometer)	Used to measure Total Organic Carbon (TOC) and Chemical Oxygen Demand (COD) reduction.	90,000	Provides high-precision measurement of Water purification efficiency (Phase I), a crucial quality control (Q.C.) metric for the project's dual purpose.
PCR Thermal Cycler	Essential for the amplification of the 16S rRNA gene for precise taxonomic identification of selected halotolerant strains.	50,000	Required for accurate and reliable identification (Phase II) to ensure system reliability and reproducibility.
Total		690,000	

III. Raw Materials & Reagents	Item	Cost (EGP)	Detailed Justification

Halophyte Biomass	Salicornia and Atriplex (local collection/purchase)	5,000	Nominal cost for acquisition, transport, and initial handling of sufficient raw plant material.
Culture Media	Nutrient Agar, Selective Media (Bushnell–Haas Agar), Minimal Salt Medium (500g * 10)	15,000	Based on average pricing of EGP 1,500 per 500 g commercial microbiology media
Enzyme Assay Reagents	DNS reagents, buffers, standards, COD kits, Nitrate/Phosphate analysis reagents	20,000	
Molecular Analysis Service	16S rRNA Gene sequencing (20-30 isolates)	30,000	Cost for chemicals like 3-5-Dinitrosalicylic acid (DNSA) and other necessary colorimetric reagents for COD and nutrient analysis over the study period.
Total		70,000	

IV. Industrial Partnership Fees	Item	Cost (EGP)	Detailed Justification
Dice Textiles	Weaving 10-20 kg of extracted halophyte fiber into basic fabric (prototype scale)	EGP 700,000	Estimated as a large, dedicated fee for the industrial scale-up of a novel fiber, covering machine time, engineering consultation, quality control, and testing. This is a significant prototype/ R&D expense, not a standard manufacturing cost.
PIL MI & Africa Medical Bandage Manufacturer	Treating the fabric/fiber into biomedical-grade gauze	EGP 750,000	Estimated as a large, dedicated fee for the industrial R&D, sterilization, quality assurance (meeting ISO 13485 standards), and validation of the novel fabric for medical application.
El Nasr Salines	Providing saline wastewater/biofilms and water purification/testing	EGP 600,000	Estimated as a dedicated fee for the industrial partner to supply critical samples, provide R&D consultation on water quality, and potentially perform large-scale contaminant removal/water quality testing on the effluent.
Total		2,050,000	

9. Equipment (One pages maximum)

- Pipettes
- Glassware
- Staining sets
- Inoculating loops
- Sterile sampling containers
- Test tubes
- Petri dish rack

Category	Available Equipment	Role in Project
Consumables & Media	Nutrient agar plates, selective media (e.g., Bushnell–Haas agar), Beakers, flasks, and filter papers.	Used for isolating halotolerant microbes and preparing minimal salt medium.
Lab Machines & Tools	Autoclave, Analytical balance, Incubator, Refrigerator, Microscope, Spectrophotometer (Basic Model), Centrifuge, Water bath, pH meter, Grinder, Laboratory oven, Orbital shaker, and Filtration setup.	Provides sterilization (Autoclave), controlled growth conditions (Incubator/Water bath), biomass processing (Grinder, Oven), and general liquid handling/mixing (Orbital Shaker).
Molecular Supplies	DNA extraction kits, Master mix, Taq polymerase, Disposable cuvettes, and Primers (27F/1492R).	Supports preparation for the 16S rRNA gene sequencing (Phase II).

10. Project Management (One pages maximum)

Task/Activity	Description	Research Team Role	Industrial Partner Role
Sample Collection	Obtaining saline wastewater from Egyptian water purification stations.	All Team Members (for execution and transport.	El Nasr Salines: Granting site access and logistical assistance for sample collection.
Isolation & Purification	Serial dilution, plating on selective media, incubation, and purification of distinct bacterial colonies.	Hams Hassan, Basant Taha, Nancy Bahi, Saria Abdelmoniem: lab work and culture maintenance.	El Nasr Salines: Providing R&D consultation on water quality and testing.
Contaminant Screening	Screening isolates for degradation efficiency of contaminants (organic carbon, nitrates, phosphates) using spectrophotometric analysis.	Hana (PI): Project supervision, data analysis, and efficiency determination.	El Nasr Salines: Potentially performing large-scale contaminant removal/water quality testing on the effluent.
Taxonomic Identification	Phenotypic characterization (Gram staining, etc.) and precise identification via 16S rRNA gene sequencing.	Hana (PI): Guiding molecular analysis and sequencing interpretation.	
Growth Optimization	Experiments to optimize growth conditions (Temperature, pH, Salinity) for selected halotolerant strains.	Hams, Basant: Executing optimization experiments.	
Enzymatic Activity & Selection	Measuring cellulase activity (e.g., DNS method) and selecting the most efficient strain.	Nancy, Saria: Performing colorimetric assays and enzyme activity tests.	
Plant Material & Pre-Treatment	Acquisition of *Salicornia europaea* and *Atriplex halimus* and preparing the biomass.	All Team Members: acquisition, transport, and initial handling of raw materials.	El Nasr Salines: Providing access to halophytic plants from salt marsh areas.
Bacterial Treatment & Purification	Using the optimized strain in the Pilot-Scale Fermentation Reactor to degrade plant biomass, liberating and purifying cellulose fibers.	Hana (PI): Overseeing large-scale fermentation and fiber extraction process.	
Fiber Characterization	Analyzing purified fibers using FTIR, SEM, and Tensile Strength Test.	Hams, Basant: Executing characterization tests.	Dice Textiles: Consulting on characterization results to ensure fitness for spinning/weaving.
Application Development	Weaving fibers into textiles and treating them for biomedical-grade gauze prototypes.	Nancy, Saria: Assisting with the delivery and initial processing of the fibers for the industrial partners.	Dice Textiles: Weaving extracted fiber into basic fabric. PIL MI & Africa Medical: Converting the refined fibers into sterile, medical-grade gauze prototypes and assisting in testing.

11. Time Schedule - Gantt chart (two pages maximum)

No.	Title of Task/Sub-task	Start Date	End Date	Duration	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14	M15	M16	M17	M18	M19	M20	M21	M22	M23	M24	Expected measurable outcomes
1	Project planning & literature review	1	4	4																									Review papers, define scope
1.1	Define bioremediation requirements	1	2	2																									Specify contaminants & goals
1.2	Select bacterial strains	2	4	3																									Choose optimal species
2	Water sampling & characterization	4	9	6																									Complete water quality profile
2.1	Collect water samples	4	6	3																									Samples from target sites
2.2	Physicochemical water analysis	5	8	4																									pH, turbidity, toxins
2.3	Biological contamination analysis	7	12	6																									Identify pathogens
3	Bacterial growth & optimization	10	16	7																									Achieve max biomass yield
3.1	Bacterial isolation	10	13	4																									Purify & identify strains
3.2	Optimize growth conditions	12	16	5																									Optimize pH, temp, nutrients
4	Fiber production & extraction	16	22	7																									Produce stable biofibers
4.1	Biomass harvesting	16	19	4																									Collect biomass
4.2	Extract & process fibers	19	22	4																									Convert biomass to fibers
5	Gauze fabrication & testing	22	24	3																									Functional biodegradable gauze
5.1	Gauze weaving/fabrication	22	23	2																									Produce gauze prototypes
5.2	Biodegradability & safety testing	23	24	2																									Evaluate strength & safety

12. Institutional Endorsement Letter
An endorsement letter should be submitted by PI's institution (scanned copy of the letter signed and stamped by the legal representative – President - of the PI's institution). The letter will state the project title, the name, position and affiliation of the PI in charge of the proposal, that the project idea was not funded or submitted to another funding agency (national or international), or otherwise declare, and that the institution approves the project.

13. Endorsement and Commitment letter of the Industrial partner (if any)
(Scanned copy of the Endorsement Letter, signed and stamped by the legal representative of the Industrial partner), stating the project title, the name, position and affiliation of the PI, Industrial partner contact person , position, and ***clear role of the industry in the project.***

Gantt chart* - Annex 4

Title of the project: Microbial Synthesis of Fibers from Salt Marshes
PI: Hana Hisham Saad
Affiliation: Nile University
Actual start date of the project: 10th of Januaray, 2026

No.	Title of Task/Sub-task	Start Date	End Date	Duration	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14	M15	M16	M17	M18	M19	M20	M21	M22	M23	M24	Expected measurable outcomes
1	Project planning & literature review	1	4	4																									Review papers, define scope
1.1	Define bioremediation requirements	1	2	2																									Specify contaminants & goals
1.2	Select bacterial strains	2	4	3																									Choose optimal species
2	Water sampling & characterization	4	9	6																									Complete water quality profile
2.1	Collect water samples	4	6	3																									Samples from target sites
2.2	Physicochemical water analysis	5	8	4																									pH, turbidity, toxins
2.3	Biological contamination analysis	7	12	6																									Identify pathogens
3	Bacterial growth & optimization	10	16	7																									Achieve max biomass yield
3.1	Bacterial isolation	10	13	4																									Purify & identify strains
3.2	Optimize growth conditions	12	16	5																									Optimize pH, temp, nutrients
4	Fiber production & extraction	16	22	7																									Produce stable biofibers
4.1	Biomass harvesting	16	19	4																									Collect biomass
4.2	Extract & process fibers	19	22	4																									Convert biomass to fibers
5	Gauze fabrication & testing	22	24	3																									Functional biodegradable gauze
5.1	Gauze weaving/fabrication	22	23	2																									Produce gauze prototypes
5.2	Biodegradability & safety testing	23	24	2																									Evaluate strength & safety

** The above chart is given as an example. In this example, cells highlighted in yellow indicate main tasks, and cells highlighted in green indicate sub-tasks. Cells highlighted in red indicate the last months of the reporting periods. A progress/final report should be submitted shortly after the end of each period. Please add more columns (for projects longer than 18 months) and/or rows (for tasks and sub-task) if needed.*

Acknowledgment Form – Annex 5

By signing below, I acknowledge that I have read, understood and accepted to comply with all the terms of the foregoing application, mentioned in STDF general conditions and guidelines for submitting an STDF research proposal, including, but not limited to:

1. The total number of the application pages should not exceed **37 pages** including a cover page, as well as all sections of the proposal (as mentioned in STDF General Conditions and Guidelines for Submitting STDF Research Proposal). **Only one PDF file is allowed to be uploaded as a proposal, including all required documents. Any supplementary files will not be considered**
2. At any time, a contracted STDF project team member should only be participating in a maximum of 3 projects (or a maximum of 2 projects as a PI/Co-PI).
3. Each PI can only submit a maximum of two proposals until notified with the evaluation results of his/her submitted proposals. The PI can re-submit a revised version of the previously submitted proposal only once and after applying STDF suggested modifications. At the time of submitting the revised proposal, the PI is required to declare that an older version of the project proposal has been previously submitted to STDF.
4. Same project should not be submitted in more than one grant.
5. Allowable budget maximum limit should be strictly adhered to in the project proposal. In all cases, requested budget has to be justified in detail.
6. STDF guidelines, IPR rules, code of ethics, …etc. (www.stdf.eg), should be read carefully and adhered to. These are integral parts of STDF contracts.
7. All proposals – in addition to PI and other data - must be uploaded to the STDF website (www.stdf.eg) by the designated deadline. Uploaded PI data should conform to the corresponding data in the application form. The PI must be a PhD holder.
8. Submitted applications will be evaluated and the applicant will be informed with the evaluation result of his/her proposal **within 4-6 months.**
9. STDF technical decisions made by remote reviewers or panels of experts are final.
10. Proposal applications will not be considered eligible and will be discarded in the following cases:
    a. Proposals submitted by e-mail or sent as hard copies or uploaded to the STDF website after the deadline.
    b. Proposals not conforming to the designated format.
    c. Proposals whose uploaded PI data does not conform to PI data in the proposal file.
    d. Proposals in which the allowable limit of any item of the budget or the total budget maximum limit has been exceeded.
    e. Proposals in which maximum allowable contracted STDF project participation limit has been exceeded (The PI & Co-PI can`t contribute with a less than 40% of their time and the contribution of any team member can`t exceed 80% (in all the submitted/running projects), except the technicians and full time research students (non-teaching assistance).
    f. Proposal does not include a scanned copy of the signed and stamped endorsement letter by the legal representative of the PI's institution stating the project title, the name, position and affiliation of the PI in charge of the proposal, that the project idea was not funded or submitted to another agency (national or international), or otherwise declare, and that the institution approves the project.
    g. Proposal does not include a scanned copy of the signed and stamped endorsement letter of the industrial partner by the legal representative of the Industrial partner in case of its inclusion in the proposal.
    h. Proposal does not include a scanned copy of the signed acknowledgment form.

Signature of the PI: Approval and Stamp of the host institution Date:

_____ Date: _____

Proposal Screening Check List

- ☐ Cover Page
  - ☐ Signed by PI
  - ☐ Signed and stamped by the legal representative – President - of the PI's institution
    رئيس الجامعة أو المركز البحثى (السلطة المختصة)
- ☐ Research Team Table
  - ☐ Signed by PI and all other team members of the research team (Live signature)
- ☐ CV of the PI and all members in team table
- ☐ English Abstract (one page maximum)
- ☐ Arabic Abstract (one page maximum)
- ☐ Introduction/Background (Two pages maximum)
- ☐ Objectives (one page maximum)
- ☐ Project Description, Methodology, Key References and International Collaboration (if any) (nine pages maximum)
- ☐ Expected Project Outcomes (two pages maximum)
- ☐ Budget Justification (two pages maximum)
- ☐ Institutional Endorsement Letter
  - ☐ Signed and stamped by the legal representative – President - of the PI's institution
    رئيس الجامعة أو المركز البحثى (السلطة المختصة)
- ☐ Endorsement Letter of the Industrial Partner
  - ☐ Signed and stamped by the legal representative of the Industrial partner
- ☐ Gantt Chart
- ☐ Acknowledgment Form
  - ☐ Signed by PI
  - ☐ Signed and stamped by the legal representative – President - of the PI's institution
    رئيس الجامعة أو المركز البحثى (السلطة المختصة)