SERBIA ACCELERATING INNOVATION AND GROWTH ENTREPRENEURSHIP (SAIGE) PROJECT

Program PRISMA

ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (ESMP)

„Ultimate biofortification and reshaping of soil microbiota for more sustainable agrifood production, environment protection and human health“ (TERRA_MADRE)

DRAFT DOCUMENT

Belgrade,

15/11/2023

ABBREVIATIONS AND ACRONYMS

ESMF – Environmental and Social Management Framework

ESMP – Environmental and Social Management Plan

ESS – World Bank's Environmental and Social Standard

SAIGE – Serbia Accelerating Innovation and Growth Entrepreneurship

SF – Science Fund

SRO – Scientific and Research Organization

PI – Principal Investigator

PIU – Project Implementation Unit

TM – Team Member

FBUB – Faculty of Biology; University of Belgrade

WP – Work Package

PGP – Plant Growth-Promoting

ICGEB – International Centre for Genetic Engineering and Biotechnology

WHO – World Health Organization

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EXECUTIVE SUMMARY

This draft Environmental and Social Management Plan (ESMP) has been prepared for the PRISMA Program, funded by the Science Fund of the Republic of Serbia. The goal of the PRISMA Program is to support research projects based on excellent ideas that in the future may have a significant impact on the development of science and research, as well as society at large, and clearly stated motivation for research within the framework of modern trends in the development of science in the relevant scientific fields. The draft ESMP document for the project entitled Project "UlTimatE biofoRtification and Reshaping of soil microbiotA for More sustAinable agrifooD production, environment pRotection and human hEalt" (hereinafter: TERRA_MADRE), was prepared in accordance with Environmental and Social Management Framework (ESMF) for the SERBIA ACCELERATING INNOVATION AND GROWTH ENTREPRENEURSHIP (SAIGE) PROJECT. The production of food for human consumption is highly dependent on the health and fertility of the soil. Improving and maintaining soil health for future generations is of utmost importance. Soil health is the most important component of the green and sustainable agricultural production, as it is severely affected by the growing world population, globalization of food supply chains, intensification of agriculture, and excessive use of chemical fertilizers. Our project aims to characterize the quality of nutrient-depleted and -overloaded soils in different regions of Serbia and to develop highly efficient soil improvers based on beneficial microbes and the best weed plants, the application of which will maintain and improve soil quality, leading to higher yields and better crop performance, while reducing the excessive use of pesticides. The purpose of the Environmental and Social Management Plan is to highlight the negative environmental impacts and management problems during the preparation and implementation of the research project "TERRA_MADRE". All field work, sampling procedures, laboratory work and waste management will be carried out in accordance with the relevant laws and/or management strategies of the Republic of Serbia. The implementation of the project activities on site will not adversely affect the quality of outdoor air and water. Considering that soil sampling will be carried out with a manual soil auger and small amounts of soil will be collected according to the standard protocol for soil sampling, which implies no use of chemicals or mechanization, the soil structure will be fully preserved and no random events potentially affecting the environment can occur. No hazardous wastes (infectious or chemical) will be generated during field work. Disposal of laboratory wastes will follow a strict FBUB protocol, so handling and storage of these wastes will have no negative impact on the environment. The implementation of project activities on site can have a negative impact on the project team members only in case of accidents. Project team members are trained personnel who are fully familiar with all risks associated with field sampling and are adequately equipped for sampling. The key components of the Environmental and Social Management Plan are: Plan for the mitigation of adverse impacts on the environment and social surrounding and Plan for monitoring the impact on the environment and social surrounding.

LEGAL AND ADMINISTRATIVE FRAMEWORK

Relevant Institutions

The relevant Ministry of Environmental Protection of the Republic of Serbia is responsible for producing and implementing the environmental policy. Other relevant institutions are: the Institute for Nature Conservation of Serbia and the Institute for the Protection of Cultural Monuments. The second relevant institution is the Ministry of Science, Technological Development (NITRA), which is responsible for the implementation of the SAIGE project.

Existing Serbian legislation

All field work, sampling procedures, laboratory work, and waste management will be in concordance with the relevant laws and/or management strategies of the Republic of Serbia), including specific rulebooks:

- Law on Science and Research ("Official Gazette of RS" No. 49/2019)
- Law on Science ("Official Gazette of the RS ", br. 116/2007, 88/2009, 88/2009, 104/2009, 10/2015 and 36/2018),
- Law on Environmental Protection ("Official Gazette of RS" No. 135/04, 36/09, 72/09, 43/11, 14/16, 76/18 and 95/2018)
- Law on Fire Protection ("Official Gazette of RS", Nos. 111/09, 20/15, 87/18 and 87/2018)
- Law on Waste Management ("Official Gazette of RS", 36/09, 88/10, 14/16, 95/2018 and 35/2023.)
- Law on Noise Protection ("Official Gazette of RS", 36/09, 88/10 and 96/2021)
- Law on Occupational Health and Safety ("Official Gazette of RS", 101/05, 91/15 and 113/2017)
- Law on Safety and Health on Work ("Official Gazette of RS", 101/05, 91/15, 113/17 and 35/2023)
- Law on Soil Protection ("Official Gazette of RS", 112/2015)
- Law on Agriculture Land ("Official Gazette of RS", 62/06, 65/08, 41/09, 112/15, 80/17, 8/2018)
- Law on disaster risk reduction and emergency management ("Official Gazette of RS", 87/2018)
- Rulebook on Records in the Field of Safety and Health at Work (Official Gazette of RS, Nos. 62/2007 and 102/2015),
- Rulebook on personal protective equipment (Office Gazette of RS, 23/2020),
- Rulebook on the method of providing first aid, the type of means and equipment that must be provided at the workplace, the method and deadlines for training employees to provide first aid (Official Gazette of RS, No. 109/2016),
- Rulebook on the procedure for inspecting and checking work equipment and testing working environment conditions (Official Gazette of RS, Nos. 94/2006, 108/2006, 114/2014 and 102/2015),
- Rulebook on preventive measures for safe and healthy work during exposure chemical substances ("Official Gazette of RS", no. 106/09, 117/17 and 107/21),

- Rulebook on the manner of storage, packaging and labeling of hazardous waste (Official Gazette of RS, Nos. 92/2010 and 77/2021),
- Rulebook on the provision of signs for safety or health at work ("Official Gazette of RS", no. 95/2010 and 108/2017),
- Rulebook on preventive measures for safe and healthy work when using work equipment ("Official Gazette of RS", no. 23/2009, 123/2012, 102/2015 and 101/2018),
- Rulebook on the procedure for inspecting and checking work equipment and testing working environment conditions ("Official Gazette of RS", no. 5/2023),
- Rulebook on records in the field of safety and health at work ("Official Gazette of RS", no. 62/2007 and 102/2015),
- Rulebook on categories, testing and classification of waste ("Official Gazette of RS", no. 56/10 and 93/2019),
- Law on Chemicals ("Official Gazette of RS", No. 36/2009, 88/2010, 92/2011, 93/2012 and 25/2015),
- Rulebook on how to keep records on chemicals ("Official Gazette of RS", No. 31/2011),
- Rulebook on the Register of Chemicals ("Official Gazette of RS", no. 16/2016, 6/2017, 117/2017),
- Rulebook on chemical advisors and the conditions that must be met by a legal entity or entrepreneur who conducts training and knowledge testing of chemical advisors ("Official Gazette of RS", no. 13/11, 28/11 and 47/12).

PROJECT DESCRIPTION

INSTITUTIONAL AND ADMINISTRATIVE PART	
Country	Serbia
Project	Serbia accelerating innovation and growth entrepreneurship (SAIGE) project
Sub-component	Science Fund of the Republic of Serbia
Program	Program PRISMA
Subprogram	Natural Sciences
Project title	**“Ultimate biofortification and reshaping of soil microbiota for more sustainable agrifood production, environment protection and human health”**
Acronym	**TERRA_MADRE**
PI contact email address	ivicad@bio.bg.ac.rs
Participating Scientific and Research Organization (SRO):	Faculty of Biology; University of Belgrade (FBUB)

Partner Research Organization on the project:	N/A
The duration of the project:	36 months
Number of researchers:	8 /eight/ (PI + 7 researchers)

The production of food for human nourishment is profoundly dependent on both soil health and fertility, with soil-based cropping systems providing up to 95% of the food. Improvement and preservation of soil health for future generations is of utmost importance as these factors are essential for open field and protected cultivation and are considered backbone of our agricultural economy. Based on these considerations, soil health is at the heart of the European Green Deal and the Serbian Smart Specialization and its ambitions for green and sustainable agricultural production, especially since numerous factors significantly affect agricultural production: growing world population, globalization of food supply chains, intensification of agriculture, excessive use of chemical fertilizers, to name a few. Having all that in mind project "Ultimate biofortification and reshaping of soil microbiota for more sustainable agrifood production, environment protection and human health" (TERRA_MADRE), designed by the team from the FBUB and selected for financing by the Science Fund of the Republic of Serbia within PRISMA program, aims to characterize quality of nutrient-depleted and overloaded soils in different regions of Serbia and create highly efficient bioformulations (i.e. soil improvers), based on the beneficial microbes and best weed plants, whose implementation will preserve and improve soil quality which will be reflected in the increase of yield and crop performance, as well as the elimination of excessive pesticide use. The implementation of the project is supported by several institutes, research and development centres and companies, such as the International Centre for Genetic Engineering and Biotechnology in Trieste, Italy, the Institute for Vegetable Crops in Smederevska Palanka, the Research and Development Institute Tamiš, the company Fertico d.o.o. in Inđija and the Regional Development Agency "Southern Banat" d.o.o. from Pančevo, with whom letters of support were signed during the preparation of the project proposal. The project is designed to be realized through activities within the laboratory, a protected environment (greenhouse), and an open field, and since it entails the application of bioformulations and a certain degree of manipulation in the soil possible impact on the environment was recognized and detailed Environmental and Social Management Plan (ESMP) was created.

PROJECT LOCATIONS

The research of the project will take place in different locations.

Soil sampling will be carried out in selected localities in Serbia and their surroundings:

PSS Institute Tamiš, Pančevo (44.94044506532959, 20.73106050103635);

Maize research Institute – Zemun Polje, Belgrade (44.87038349974005, 20.329546230426956);

Family agricultural holding „Jovana Anđelković", Brestovac, Niš (43.14745915247031, 21.879073138081576);

Institute for Vegetable Crops, Smederevska Palanka (44.354594999419525, 20.945671516677002).
The fields are surrounded completely by natural surroundings.

Soil samples for the physical-chemical analyses will be transported to the laboratories of the:
Regional Development Agency South Banat, Pančevo (44.87149140951222, 20.644977999405818)
University of Belgrade – Faculty of Chemistry, Belgrade (44.819180232979136, 20.4595868897266)
Institute for soil science, Belgrade (44.78067528682269, 20.448743585604298).
The research facilities are surrounded by natural surroundings and some civil and business households, but are not in the immediate vicinity.

Soil samples for the biological analyses will be transported to the laboratories of the:
University of Belgrade – Faculty of Biology, Belgrade (44.819180232979136, 20.4595868897266)
The research facility is surrounded by some civil and business households, but is not in the immediate vicinity.

I Open field phase

Sampling of soil will be performed from three nutrient-depleted and three overloaded soils within selected localities in Serbia during all four seasons of the first year. Agreements on business and technical cooperation with legal persons, necessary for access to all of the sampling locations, are in the process of being obtained (letters of support were submitted during the project application). Five replicates (5 g each) will be collected in each field from a depth of 15 cm, using a hand soil auger, thus minimizing any disturbance to the soil structure. The samples will be placed in sterile sampling bags, put on ice, and transported to the laboratories that will carry out the mineral content, pesticides, trash elements analysis, and physical-chemical characterization of soil. Since all of the necessary agreements will be procured before the sampling, and a responsible person will be present at all times, there is no adverse impact of sampling on the local population. Realization of these activities has no adverse impacts on the quality of the outdoor air or water.

Furthermore, the application of soil improvers in an open field in the maize cropping system will not impose health hazards or cause ecological disturbances since the project limits the usage of autochthonous microbial strains to the local ones, already present in the soil, and reintroduced microbes are preselected according to biosafety risk categories. Only biosafety level 1 microbes (BSL-1 - “do not cause disease in healthy humans and should pose a minimal potential hazard to laboratory personnel and the environment”) or “GRAS” group microbes ("generally recognized as safe" by the United States Food and Drug Administration (FDA)) will be included in the bioformulations. Sowing, monitoring, and harvesting during

this phase of the research will be done together with our partners, listed abovementioned locations, following company protocols for the safe implementation of these activities

During soil sampling and application of bioformulations in the field, standard safety microbiological protocol will be conducted by the sampler (sterile gloves, surgical face masks, safety goggles, sterilization of tools between sampling points) thus eliminating any risk for the handler. Handlers are all trained personnel who are very familiar with all of the risks of sampling in the field. For any accidental events, that could occur in the field, such as an allergic reaction to an insect bite, injury from a fall, a cut, etc., a first aid kit will always be close at hand with the transport of the injured person to the nearest ambulance. To eliminate any potential risks from weather-related extreme events field research will be carefully planned in advance, taking into account the weather forecast, so that all research activities could be performed on days with adequate weather.

II Laboratory phase

Sample preparation for metabarcoding analysis and whole genome sequencing, isolation and further handling of culturable bacteria and fungi from soil, characterization of plant growth promoting, biocontrol, and biofortification potential of microbes, and synthetic consortia designing will be performed in the laboratories of the FBUB (Department of Biochemistry and Molecular Biology and Department of Algology and Mycology) in Belgrade following strict safety and sterile work guidelines. Generated microbiological and chemical waste, disposed of in bags and/or boxes for infectious/chemical waste and placed in a special room intended for that purpose, will be removed regularly by specialized companies for handling chemical and biological waste. Waste disposal follows strict protocol (Hazardous waste management plan (31.10.2012) at the FBUB) which entails labeling the name of the waste, date of disposal, quantity, and the name of the organizational unit (department) from which the waste is disposed of, name and surname of the person who disposed of the waste, and contacting the person responsible for its handling within the organization (Environmental protection officer).

Within laboratory conditions, handling of isolated fungal cultures could lead to an increase of indoor airborne fungal spore load, with an adverse effect on human health, i.e. project members working with the sporulating fungal cultures. For this reason, all laboratory work with fungal cultures is realized by trained personnel within a laminar flow cabinet, with regular disinfection cleaning and sterilization via UV treatment, taking into account all precautionary measures of sterile laboratory work. Quality of the air and the degree of surface contamination within the lab is being checked on a weekly basis to eliminate the possibility of presence of spores from pathogenic and toxigenic fungi according to the indoor air quality WHO guidelines (World Health Organization WHO Regional Publications European Series, No. 31: Indoor Air Quality: Biological Contaminants; Report on a WHO Meeting; WHO: Copenhagen, Denmark, 1988; and Rao, C. Y., Burge, H. A., & Chang, J. C. (1996). Review of quantitative standards and guidelines for fungi in indoor air. Journal of the Air & Waste

Management Association, 46(9), 899-908.). Furthermore, all surfaces are disinfected daily after work is done and regularly being checked via ATP bioluminescence method.

During the composting process, the developed compost mixture might contain unwanted bacterial strains and other substances with deteriorating effects on the soil and the environment. To eliminate these unwanted factors, compost is produced via the biosterilization method not allowing the concentration and existence of pathogens and other substances. Furthermore, both the finished compost and its components are regularly tested via lab and microbiological methods to obtain controlled compost of defined quality and characteristics.

Monitoring of (1) physical-chemical characteristics, thrash metals, pesticides, and minerals in soil; (2) minerals in weed plants; (3) physical-chemical analysis and elemental content of compost materials; (4) chemical characterization of compounds in maize grain; as well as (5) Sanguer sequencing, metabarcoding and whole genome sequencing of bacterial and fungal isolates, will be outsourced, and generated waste will be disposed of per the protocol and safety regulations of outsourced companies.

III Protected environment (greenhouse) phase

Maize seedlings will be cultivated in pots filled with typical soil (sterilized chernozem) in a controlled environment: growth chamber and greenhouse. Since this phase of the project is realized within a completely controlled and protected environment realization of all activities (maize cultivation, application of bioformulations, plant analysis) has no adverse impacts on the quality of the outdoor air, soil, or water. Greenhouse tests will be done with our partners from the Institute for Vegetable Crops (Smederevska Palanka, Serbia), while the experiments in the fitotron plant growth chamber will be carried out at the SRO in a room specially designed for the chamber under controlled conditions. Maize seedlings will be cultivated in pots filled with a typical soil (chernozem), and pots will be placed in the controlled environment of a growth chamber. Pot filled with the untreated soil will serve as negative control, while soil enriched with chemical fertilizers (N:P:K - 15:15:15) will serve as a positive control. Tested bioformulations will contain only biosafety level 1 microbes already proven *in vitro* to possess beneficial properties: biocontrol, plant-growth promoting and biofortification.

ASSESSMENT OF THE POTENTIAL ENVIRONMENTAL AND SOCIAL IMPACTS OF SPECIFIC TASKS WITHIN THE PROJECT

Potential impact on sampling sites

Realization of project activities in the field has no adverse impacts on the quality of outdoor air and water. Sampling of soil will entail collection of only a small portion of soil from each sampling field (5 g per sample in five replicates; 25 g of soil in total per field) since it is more than enough soil to isolate autochthonous bacteria and fungi (1 g of soil can contain up to 10^9 bacterial cells and 10^6 fungi) and conduct all of the necessary analyses of soil characteristics

in the laboratory. Having in mind that soil sampling will be done via hand soil auger and small amounts of soil will be collected following standard protocol for soil sampling which does not imply use of any chemicals or mechanization, structure of soil will be completely preserved and no accidental events can happen that will potential impact the environment (soil, water or air).

Potential impact of generated waste

No dangerous waste (infectious or chemical) will be generated during fieldwork. Any other generated waste, such as remains of sterile vials and instruments packaging, or other human activity, will be collected after fieldwork and disposed of at the laboratory.

Chemical and infectious waste generated (expected quantities are up to 10 kg for the entire project duration) in the laboratory will be disposed of in bags and/or boxes for chemical/infectious waste and placed in a special room intended for that purpose and removed regularly by specialized companies for handling chemical and biological waste with whom FBUB has signed contract. Waste disposal follows strict protocol (Hazardous waste management plan at the FBUB) and as such handling and storing of this waste has no adverse impact on the environment.

Potential impact on the health and safety of the project team

Realization of project activities in the field can have negative impact on project team members only in case of accidental situations such as snake or insect bite, fall, cut etc. In these instances a first aid kit will be used and injured person transported to the nearest ambulance thus eliminating and long lasting negative effect. Project team members are all trained personnel who are very familiar with all of the risks of sampling in the field and adequately equipped for sampling (sterile gloves, surgical face masks, safety goggles, sterilization of tools between sampling points) so no risk is associated with sampling itself. To eliminate any potential risks to the team members from weather-related extreme events (thunderstorms, hail) field research will be carefully planned in advance, taking into account the weather forecast, so that all research activities could be performed with maximum safety of the sampler.

Within laboratory conditions, handling of isolated fungal cultures could lead to an increase of indoor airborne fungal spore load, with an adverse effect on human health, i.e. project members working with the sporulating fungal cultures. For this reason, all laboratory work with fungal cultures is realized within a laminar flow cabinet, with regular disinfection cleaning and sterilization via UV treatment, taking into account all precautionary measures of sterile laboratory work".

Work in the laboratory follows strict FBUB's protocols (Rulebook on work with amendments, 18/59_09.12.2014, 18/31_30.09.2015, 18/21_07.04.2017, 18/44_25.12.2017, 18/29_20.11.2020 and 18/22_19.05.2021 and Act on risk assessment 18/29_08.06.2018) for safe and sterile work so any impact on the health and safety of project team members could result only from accidental situations such as fall, a burn or a cut. As is the case with the fieldwork, in these instances first aid will be given and injured person transported to the nearest ambulance.

Community health and safety

There is no risk of harmful bacteria and fungi spreading into the surrounding community. After the initial isolation of bacteria and fungi from the soil in a laminar flow cabinet, with regular disinfection cleaning and sterilization by UV treatment, only beneficial (harmless) bacteria and fungi are reisolated and stored in the FBUB culture collections, taking all precautions for sterile laboratory work. All other primarily isolated microorganisms from the soil are stored and disposed of according to the above protocol. All these activities are carried out by trained laboratory personnel and the handling and disposal of waste is undertaken by a person responsible for its handling within the organization (Environmental Protection Officer). In addition, since the creation of the Department of Biochemistry and Molecular Biology and the Department of Algology and Mycology, all the precautionary measures mentioned have been carried out regularly and there has not been a single case of spread in the community since the University was founded (170 years). All activities will be carried out in accordance with the emergency preparedness plan, which is in line with the law on disaster risk reduction and emergency management.

SUMMARY OF ENVIRONMENTAL AND SOCIAL IMPACT

During the preparation and implementation phase, of the scientific research project TERRA_MADRE potential environmental impacts are listed below (Table 1).

Table 1 - Review of the impact on the environment for the duration of the project.

INFLUENCE	SIGNIFICANCE	COMMENT
Impacts on land use and settlements	Does not exist	During the realization of the project, there will be no expropriation of land
Ground and surface water	Low	Due to low amount of water that can come to the recipient by drainage, the consequential impact is negligible
Air quality	Low	Temporary negative impact of fungal spore release during laboratory work will be successfully mitigated following strict laboratory protocol on sterile work
Flora and fauna (protected areas and species)	Low	Sampling locations are not within protected areas with endangered and protected species
Monuments	Does not exist	During the realization of the project, there will be no impact on the cultural heritage
Noise	Low	During the realization of the project activities no noise of inadequate levels will be produced
Soil management	Low	With the application of appropriate measures of waste management
Management of Waste	Low	In accordance with existing waste management plan
Working in the field	Moderate	In accordance with protocols and application of measures for safe working in the field
Management of hazardous materials, including hazardous waste	Low	In accordance with existing hazardous waste management plan

Table 1 - Review of the impact on the environment for the duration of the project.

INFLUENCE	SIGNIFICANCE	COMMENT
Medical waste management	Low	In accordance with existing medical waste management plan
Working in the laboratory including Life and Fire Safety	Moderate	In accordance with protocols and application of measures for safe working in the laboratory. Adequate control measures are aligned with safety procedures related to working with chemicals.
Safe management of chemicals, biohazards and hazardous materials	Low	In accordance with existing chemical and hazardous management plan
Handling of gases under pressure (H&S at work and prevention of accidents)	Does not exist	During the realization of the project, there will be no handling of gases under pressure
Use of chemicals	Low	All researchers in the research laboratory are familiar with safety procedures related to working with chemicals and all Safety Data Sheets for Chemicals.
Health & Safety of the local populations (Field activities)	Does not exist	During the realization of the project field activities, there will be no adverse effects on health and safety of the local population
Cumulative impacts	Low to Moderate	Realization of the TERRA_MADRE project has Low to Moderate cumulative impacts

15/11/2023

ESMP prepared by:

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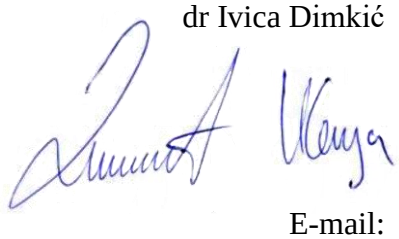

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Environmental and Social Management Plan (ESMP) - TERRA_MADRE project

I. MITIGATION PLAN

Phase	Issue	Mitigating Measure	Cost of Mitigation (If Substantial)	Institutional Responsibility*	Supervision
Project preparation	**I.** Agreements on business and technical cooperation necessary for access to all of the planned sampling locations will be prepared before sampling. Due to unforeseen circumstances some sampling location might become unavailable during project realization.	**I.** Alternative sampling locations were chosen, in case of inaccessibility due to any external event which could not be calculated, and agreements on business and technical cooperation necessary for their access will be prepared before start of the project thus allowing reaching of the proposed project deliverables.	**I.** Cost will be covered by personal budget	**I.** PIU/SF/FBUB	
Project preparation	**II.** Climatic chamber with fitotron system will be procured as the equipment necessary for the realization of the project. Usage of this new equipment will require specific training in the laboratory.	**II.** Specific training for all team members on the use of climatic chamber with fitotron system will be provided by the equipment supplier.	**II.** None	**II.** FBUB	PIU/SF/FBUB

Project preparation	**III**. Life and fire safety (LFS) procedures in laboratory	**III**. All researchers are familiar with the current Evacuation Plan and Protection and Rescue Plan. All researchers are familiar with the dangers of fire and fire protection measures and are trained in handling fire extinguishers, hydrants and other devices used for extinguishing fires by the Law. All researchers in the Project are familiar with the "Instructions for action in case of fire".	**III.** None	**III**. FBUB	PIU/SF/FBUB
Open field phase - execution	**I.** Soil sampling disrupts structure of the soil and disturbs local population.	**I.** 25 g of soil (5 x 5 g) will be collected in each field from a depth of 15 cm, using a hand soil auger, thus minimizing any disturbance to the soil structure. **I.** All of the necessary agreements will be procured before the sampling, and a responsible person will be present at all times, so there is no adverse impact of sampling on the local population.	**I.** Not substantial	**I.** FBUB	PIU/SF/FBUB
	II. Selection of microbial strains - Certain microbial strains in soil might impose health safety and ecological disturbances.	**II.** The project limits the usage of autochthonous microbial strains to the local ones, already present in the soil, and BSL-1 and GRAS microbes.	**II.** Not substantial	**II.** FBUB	
	III. Accidental events that could occur during field work of the project team members (allergic reaction to	**III.** First aid kit is part of the field equipment. Transport of the injured person to the nearest ambulance will be conducted when necessary.	**III.** Not substantial	**III.** FBUB	

	an insect bite, injury from a fall, a cut, etc.). **IV.** Weather-related extreme events prevent field work. **V**. Fear and panic of the local population	 **IV.** Carefully planning of field work in advance, taking into account the weather forecast will be performed to insure field work is done in adequate weather conditions. **V**. During the realization of the project field activities, there will be no adverse effects on health and safety of the local population. All population currently present will be informed previously by researchers and cooperants.	 **IV.** Not substantial **V**. Not substantial	 **IV.** FBUB **V.** FBUB	
Laboratory phase - execution	**I.** Handling of isolated fungal cultures could lead to an increase of indoor airborne fungal spore load in the laboratory, with an adverse effect on human health. **II.** Pollution of the environment due to improper management and disposal of infectious and chemical waste generated during laboratory work.	**I.** All laboratory work with fungal cultures is realized within a laminar flow cabinet, with regular disinfection cleaning and sterilization via UV treatment, taking into account all precautionary measures of sterile laboratory work. **II.** Generated infectious and chemical waste will be disposed of in bags and/or boxes for infectious/chemical waste and placed in a special room intended for that purpose and removed regularly by specialized companies for handling chemical and biological waste with whom FBUB has signed contract. Waste disposal follows strict protocol (Hazardous waste	**I.** Not substantial **II.** Not substantial	**I.** FBUB **II.** FBUB	PIU/SF/FBUB

		management plan at the University of Belgrade - Faculty of Biology).			
	III. Unwanted microbial strains present in the bioformulations.	**III.** Quality control of each bioformulation produced: concentration, colony morphology and molecular identification.	**III.** Not substantial	**III.** FBUB	
	IV. Created compost mixture contains pathogens and other substances with deteriorating effect on the soil and the environment.	**IV.** The compost is produced by the process not allowing concentration and existence of pathogens, pesticides and other substances. **IV.** Final compost and individual components are regularly tested using regular lab and microbiological testing.	**IV.** All the costs associated with the development and testing are budgeted.	**IV.** FBUB	

*Items indicated to be the responsibility of the contractor shall be specified in the bid documents

II. MONITORING PLAN

Phase	**What** parameter is to be monitored?	**Where** is the parameter to be monitored?	**How** is the parameter to be monitored/ type of monitoring equipment?	**When** is the parameter to be monitored- frequency of measurement or continuous?	Monitoring Cost	Responsibility	Supervision
	Agreements on business and technical cooperation necessary for access to all of the sampling locations.	Institution implementing the project.	By checking before going to the field.	Each time, before going to the field location.	None.	WP Coordinator – PI.	PIU/SF/FBUB
	Personal protective equipment for personal protection during field work (sterile gloves, surgical face masks, safety goggles, safety boots, etc.).	On-field visual assessment.	Use of equipment for personal protection.	Regularly, during the project duration.	Not substantial.	WP Coordinator – PI.	
	Equipment for health safety during field work – first aid kit.	On-field visual assessment.	Use of equipment for health safety.	Regularly, during the project duration.	Not substantial.	WP Coordinator – PI.	

Open field phase – preparation and execution	Soil health status.	Laboratory of the institution implementing the project and outsourcing companies.	Metabarcoding analysis (SRO) and determination of mineral content, pesticides, trash elements, and physical-chemical characterization of soil (outsourcing companies).	During the first year of project implementation and after bioformulation application.	As defined by the project budget.	WP* Coordinator – PI.	
	Efficiency of the designed soil improvers in open field.	Laboratory of the institution implementing the project and outsourcing companies.	Metabarcoding analysis and crop parameters (SRO); physicochemical properties of the soil and chemical characterization of compounds in maize grain (outsourcing companies).	After bioformulation application in the third year of the project.	As defined by the project budget.	WP Coordinator – PI.	
Laboratory phase - execution	Beneficial properties of soil microbes.	Laboratory of the institution implementing the project.	*In vitro* assays for characterization of PGP, biocontrol and biofortification properties of	Regularly, during the implementation of WP2*.	As defined by the project budget.	WP Coordinators – PI and TM2*.	PIU/SF/FBUB

			microbes.				
	Bacterial strains used in bioformulation.	Laboratory of the institution implementing the project.	Metabarcoding analysis.	With every batch bioformulation produced.	As defined by the project budget.	WP Coordinators – PI and TM1*.	
	Quality of the produced compost.	Laboratory of the institution implementing the project and outsourcing companies.	Microbiological analysis (SRO) and physicochemical properties of the compost (outsourcing companies).	With every batch compost produced.	As defined by the project budget.	WP Coordinators – PI and TM5*.	
	Efficiency of the designed soil improvers in greenhouse environment.	Laboratory of the institution implementing the project.	Plant analysis including shoot and root length, and their wet and dry biomasses.	After bioformulation application at the end of the second year and the beginning of the third year of the project.	As defined by the project budget.	WP Coordinator – PI.	
	Life and fire safety (LFS) procedures in laboratory	Laboratory of the institution implementing the project.	Visual inspections and checks of the documentation	Periodically during the implementation of the project	Not substantial.	Responsible person for LFS in SRO	