

Sub-Theme 6.1. Biosciences Research

Rationale

The alarming rate of human population growth that has put greater pressure on the environment, and the parallel need for new knowledge, are increasing. To meet the increasing human needs for new knowledge, conducting cutting-edge basic bioscience research is of paramount importance. Cutting edge basic bioscience research advances scientific knowledge that can be applied for advancement in agriculture, health, industry, natural resources conservation, and other sectors.

Aim

The main aim of this sub-theme is to explore, generate, and document knowledge on biodiversity resources, bio-fuels, and industrial materials from novel biological sources.

Description

The sub-theme deals with the study of organisms from molecular and cellular levels up to the whole organism, population, and ecosystem. Research under this sub-theme also focuses on systematics, diversity, physiology, ecology and genetics of plants, animals, microbes, and tools and technologies underpinning biological research.

Potential Collaborators

National and overseas universities, the Federal Ministry of Science and Technology, Ethiopian Environmental Protection Agency, and Ethiopian Standards and Quality Authority.

Expected Output

- Explored and documented microbial, plant and animal biodiversity resources of Ethiopia, particularly in the eastern part of the country

- Broadened and advanced biological knowledge, skills, and innovation that maximize the impact of bioscience
- Enhanced national and international research partnerships in bioscience research
- Improved awareness on biological resources and sustainable utilisation

Research Areas

6.1.1. Microbiological research

This research area encompasses biodiversity of bacteria, fungi, algae, protozoa, and other simple eukaryotic organisms and their fundamental life processes. It also addresses evolutionary and genomic microbiology through genomic analyses and metagenomic investigations of microbial populations. Biodegradation of environmental or anthropogenic chemicals, geo-microbiology and environmental microbiology that are related with interactions among microorganisms are also focus areas.

6.1.2. Zoological research

This research area encompasses species composition of animals, distribution and diversity, morphological and anatomical variations among animal species, biology of animal species, epidemiology of parasites and their association, testing and documenting efficacy of medicines, damages caused by animal pests, population ecology of animals, and population dynamics of economically and medically important animal species.

6.1.3. Botanical research

This research area focuses on plant systematics and documentation of plant biodiversity and utilisation by indigenous people. It deals also with plant physiology to understand the principles behind plant growth and development, reproduction, etc. Elucidation of biochemical and physiological responses of plants to various environmental conditions will also be treated under this research area. Plant ecology, under which plants interact with biotic and abiotic factors, is also the focus of this research area.

6.1.4. Genetics research

This research area studies the effect of genes on the phenotype and gene mapping on chromosomes. It also deals with molecular genetics concerning how alternative forms of genes differ at the molecular level and how one form of gene mutates into another alternative form as well as how it results in different expressed traits. The research also deals with population genetics, focusing on the patterns of transmission of complex traits whose expression depends on multiple genes as well as environmental factors.

6.1.5. Biotechnology and molecular biology research

This research area focuses on characterisation of high value added metabolomics and their effects on biological systems. In addition to this, emphasis will be given to screening of biomass for future bio-energy needs of the country. This research area also encompasses plant and animal biotechnology, medical biotechnology with emphasis on stem cell research, fermentation technology, bioremediation, enzyme engineering, recombinant DNA technology, genomics, proteomics, and tissue culture.

Beneficiary

Agricultural sectors, food processing industries, pharmaceutical industries, Federal Ministry of Health, Universities, research institutions, and the wider community