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Biotechnology, Genetic Resources and Bioeconomy Related Activities in Turkey

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Abstract

To benefit from Biotechnology, Genetic Resources and Bioeconomy Turkey needs to increase the number of scientists working in this area, and also it should not only involve technology transfer but also the creation of new products from rich genetic resources and benefit economically from the "nature and natural resources" nationally and also at European level, which KBBE-NET may provide such an opportunity during the candidacy period through cooperation and integration within the Framework Programmes.

Finally, KBBE (Knowledge Based Bioeconomy), Industrial Biotechnology, Microbial Biotechnology and Genetic Resources are accepted in Turkey as a key for the sustainable development of the country because of its agricultural and industrıal production potentials.

Key words: Industrial Biotechnology, Bioeconomy, Genetic Resources.

INTRODUCTION

In Turkey, in our Biotechnology Research Center, we intend the use of plants and microorganisms which have a biological power and a potential of rich gene, for Biotechnology and Bioeconomy. We also work up for implementing new national and international projects aimed at serving to Science-Technology and R&D of our country [1].

Some Study Areas

Plant Biotechnology

Tissue Culture and Genetıc Transformatıon
Molecular Plant Breding
Plant Biodiversity
Plant Genetic Resources

Figure 1. *Ministry of Food, Agriculture and Livestock, Central Research Institute for Field Crops, Biotechnology Research Center*

Figure 2. *Some Study Areas in Biotechnology Research Center*

Microbial Biotechnology

Microbial Biotechnology and Genetic Resources
Microbial Biodiversity
Microbial Genetic Resources
Enzymology
Genetic Engineering
Bioeconomy Studies

Turkey's Vision

To be a country to form a basis for underwork for researches necessary for developing science and technology and to put into service for universities, public institutions and private sector,

To be a country producing Plant and Microbial Biotechnology projects that will help to get strong national and international collaboration at biotechnology and bioeconomy area [1].

Some areas related to Biotechnology, Genetıc Resources, Bioeconomy and Turkey's Mission

To determine degree of genetic diversity and relationship of plant species and varieties,

To reveal important genes in terms of agriculture by marker assisted selection techniques in wild relatives of culture plants, developed varieties and breeding lines,

To help developing new varieties and adding new qualities to existent varieties,

To carry out research investigating agriculturally important abiotic and biotic stres factors, resistance mechanism to sickness and pests,

Plant production free of virus and pathogens and fast reproducing by using tissue culture techniques,

To shorten the time for breeding and developing settled plant lines by double haploid techniques,

To integrate the acquired results into breeding programs,

To contribute to national R&D

The plants using tissue culture methods to replicate faster, achieves plants free from viruses,

To ensure isolation, characterization and conservation of microorganism used in other industries especially in food and agriculture sector,

To produce metabolites with fermentation processes,

To produce and purify microbial enzymes and to enhance processes and methods comprising their immobilization and stabilization,

To analyze structure-function relationships of proteins,

To develop microorganisms by mutations techniques,

To improve activities of enzymes by recombinant DNA technologies and to obtain sustainable alternative energy-focused microorganisms, enhance renewable energy resources and to render service to bioeconomy,

To produce energy and bioethanol catalyzed by microorganisms from stem, straw etc. biomass of field crops such as wheat, corn, rapeseed, safflower, etc.,

To develop microorganisms capable of producing high value-added products with gene manipulation,

To produce, purify, characterize proteins which have an agricultural and industrial importance and to make them available for use of industry,

To carry out genomic, proteomic and metabolomic studies as well as scientific researches,

To implement educational projects [1,2].

Objectives of the KBBE-NET (Knowledge Based Bioeconomy Network)

The main role

To support the Commission and the Member States to achieve a coordinated effort in the development and implementation of a European research policy for a knowledge-based bio-economy.

Possible activities

Strategic discussion and recommendations for establishing a European Research Agenda in the long term (FP7, and beyond) which should allow to build a European Knowledge Based Bio-Economy.

Contribution to the update of the Life Sciences and Biotechnology Strategy in 2007 and hereby revitalising the strategy.

Exchange of information between Member States regarding national research policies and mapping of activities including international cooperation.

Cooperation between Member States (joint research programmes, common infrastructure, training programmes etc.).

Other activities [3].

Bioeconomy and Industrial Biotechnology related activities in Turkey can be catagorized as follows;

Research and developmental studies
Political and strategically efforts and incentives
Industrial and agricultural inventions and productions

Main Financial Sources for Supporting R&D Activities

The Scientific and Technological Research Council of Turkey**)** (TÜBİTAK)
State Planning Organization (SPO)
Funds of Universities
Very limited finacial source from private sector

Institutions Conducting Research and Developmental, Educational Studies on KBBE Bioeconomy related Activities

Universities with the large facilities to conduct research projects regarding all aspect of Bıotechnology and implementing educational programs related with the Biotechnology.

Govermental Institutions and Organization

Ministry of Food, Agriculture and Livestock, Ministry of Health, Ministry of Environment and Ministry of Forestry and Water Affairs, Ministry of Development,
Departments, Directorates and Institutes working under the administration of those Ministries
The Scientific and Technological Research Council of Turkey

Private sector organizations have very limited contribution.

Recent Strategies and Plans regarding KBBE related activities for sustainable economic development of Turkey [3,5]

In recent **"*Economical Development Plan*"** prepared and published by State Planning Organization (SPO), Industrial Biotechnology is underlined as most important scientific research area to be supported

In **"*Vision 2023 Strategies for Science and Technology*"** document prepared collaborative work of Universities, NGOs and TUBİTAK, Biotechnology took important place in scietific research priorities of Turkey

"Supreme Council for Science and Technology" chaired by Prime Minister gave Biotechnological Research studies important place in state policy of Turkey for its economical development

KBBE related Activities in Agriculture and Industrial Biotechnology of Turkey

Large Agricultural Capacity and arable land areas of Turkey will be very important factor for providing feedstocks (crops, seeds, plants etc) to be needed for production bio-based products in future. Large feedstock capacity of Turkey will be good source for meeting the need of KBBE activities in EU member countries. Number of plants producing bio-fuels (bio-alcohol and bio-diesel) are increasing in course of time. There are substantial number of enterprises producing food (such as baker yeast) and drinking materials (beer and wine etc) using conventional Biotechnological Processes [4,6].

RESULT

Turkey is a major agricultural producer.

Most of the technologies related to the KBBE (Knowledge Based Bio-Economy), are related to the agriculture in Turkey. Turkey is aware of the fact that application of new technologies to agriculture will play a major role in its development and growth [6].

Agri-food industry has been and will be the base for Turkish economic growth. Turkey covers the "knowledge-based bio-economy" for its sustainable economic growth in its development strategies as other European Member States [7].

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