

KBBE-NET for Turkey: An Initiative to Transform Global Threats into Opportunities

Assoc. Prof. Dr. Talat Çiftçi
BIOSFER Ltd. (talat@biosfer.com.tr)

SUS-CHEM Sept. 25, 2008

Turkey

Population: 70,8 million

Area: 783.562 sq km

GDP: 748. USD billion

GDP per capita: 10,738 USD

Unemployment: 8,4 %

R&D employment (per 1.000 inhabitants - 2002): 3,3

business: 0,4, government: 0,04

higher education: 2,6

Per capita expend. on R&D: 46 € 2006

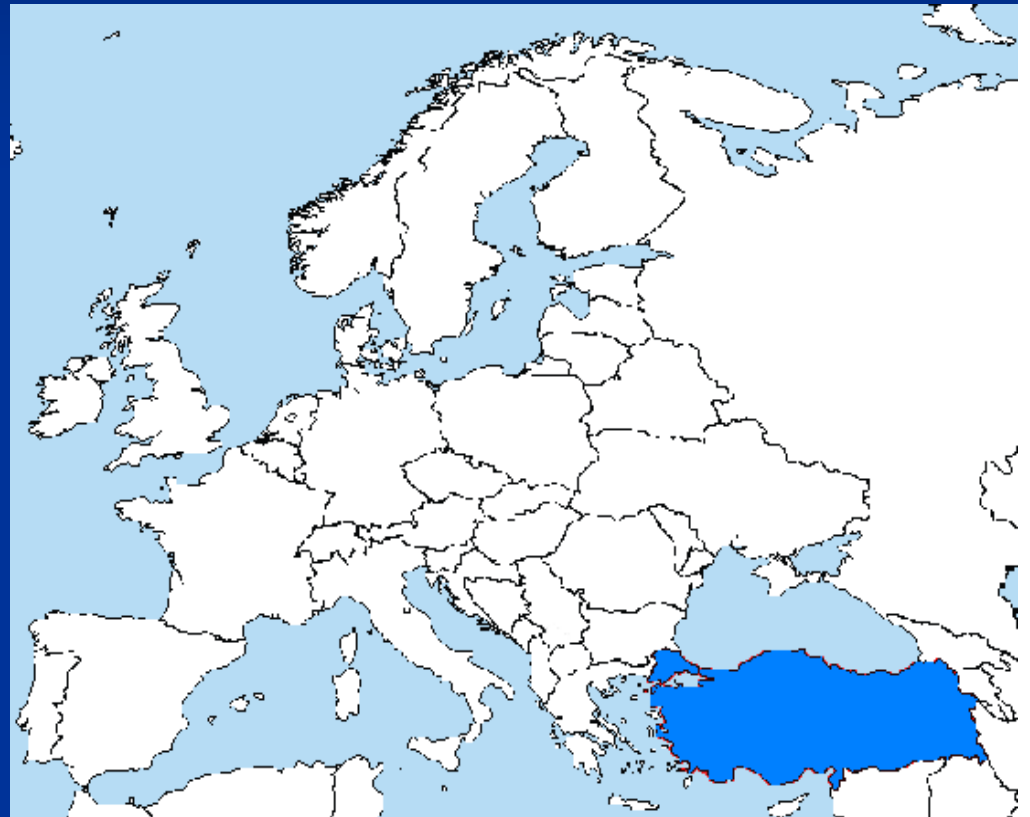
business: 17 €, government: 5,5 €

higher education: 23,5 €

Patents per million inhabitants: 8

GERD (2005): 0,79 %

business: 29 % of GERD



Status of Bioeconomy in Turkey?

- Soaring petroleum and other fossil fuel prices have brought the renewable/biobased fuels into spotlight for Turkey.
- Potential food shortage and increasing biofuels production have proven the importance of agricultural products.
- The increased environmental pollution and the global warming have also sparked the interest in bioprocesses and biological waste treatment alternatives.

Turkey may have a better chance for global competitiveness in bioeconomy, for instance 20% of world's baker's yeast is produced in Turkey.

Turkey's Resources for Bioeconomy R&D

R&D Resources

- Turkey has been increasing R&D Budget to achieve the EU average.
- Turkey has been taking part in the EU 6th and 7th Frame programs

R&D Environment

Special Research Centers (eg: TUBITAK-MAM, GMBAE; culture collection at KUKENS)

- ~20 biotechnology centers in major universities (ITU, Ege U, ODTU, Ankara U, Bogazici U, Istanbul U, Bilkent, Cukurova, Hacettepe, Marmara, Sabanci, Koc, Halic, Yeditepe, 9 Eylul etc.)
- 31 Food Sci.&Eng. Dept.
- 20 Agricultural Eng.Dept. 60 Agro-Research Centers. (eg: extensive seed banks, biodiversity libraries)
- 50 Biology Dept.
- 9 Forestry Dept., 9 Forest Res. Inst.

KBBE in Healthcare

- The market for healthcare services, pharmaceuticals and medical devices are USD 40 billion.
- Many new companies have been active in various applications of biotechnology in healthcare, such as, Metis, Iontek, ITT, Matriks, Orsem, Bıçakçılar, Novogenix, Depa, Salubris, Onkim, ATI, Genkord, Bahceci, Pakize Tarzi, Türkök, Nemed, Genomed, Amphi, Dr.Zeydanlı, Ars Arthro, Biomedtek, Progen, Medimiks, BantMedikal, NetKom, Troyka Med, Kardiosis, Arıntek, DeltaMed, InterFarma, H2Biotek, Biolab, Obitek, Nanobiz.

There are 31 Medical Schools.

KBBE for Food Industry

- Baker's Yeast 20% of the world production (Pakmaya, Akmaya, Ozmaya, Mauri)
- Pickles and Vinegar (Fersan +)
- Mushrooms (*Agaricus bisporus*, *Lentinus edodes*, etc.)
- Dairy Products, Yogurt and Cheese: (Pınar, Tikveşli, Yörsan +)
- Alcoholic Beverages (Efes, Tuborg, Mey+)
- Other traditional fermented food and drinks, Boza, Kefir, Tarhana (Vefa Boza)

.....
Potential for probiotics and inocula.

31 Food Science and Eng. Depts

KBBE in Agriculture

- Plant Libraries for the Protection of Biodiversity
- Tissue Culture Technology and Seed Technology
(May, EgePlantek, SeTo, Toros, Vitro, Yuksel, Piser)
- Microbial Preparations for Seed and Roots
(*Rhizobium*, *Trichoderma*, *Pseudomonas* etc.)
- Microbial Control of Insects and Plants (*Bacillus thuringiensis*) Delta Tarım
- 16 Agricultural Engineering Departments

Turkey's Future Potential in Agriculture

Turkey has 27 million hectares land for agriculture and 21 million hectares of forests.

33% of the population is employed in agriculture.

Agricultural and animal products constitute around USD 45 billion turnover.

In the near future, about 4 million hectares land will be irrigated with the completion of the GAP, DAP and KOP irrigation projects. More than USD 20 billion additional turnover is expected with the employment potential for around 5 million people.

KBBE in Animal Husbandry

- Breeding and Vaccines (Şap Enst, Provet, Dolvet, Egevet, Vetal Keskinoglu)
- Probiotics for Feed (*Lactobacillus*)
- Diagnostic Kits (Avian Flu) (Metis)

13 Veterinary Departments

KBBE for Energy

- Biogas from waste is becoming popular (Pakmaya, Mauri,+)
- Biogas Technology (Arbiogaz, Sistem, Mass,)
- Bioethanol may be economical if petroleum prices continue going up (Panko-Çumra 84 million lt/year, Tezkim 40 million lt/year, Tarkim 30 million lt/year)
- Biodiesel Production from virgin and recycled oils (Ezici, Kolza, BioTurk, DB Tarımsal, Delta Petrol, UNIT, Çevresel Kimya, Akel, AlBiyoBir, Cukobirlik, MarmaraBirlik, TrakyaBirlik etc.)

KBBE for Chemicals

- Dyes (Setaş- ITU MOBGAM, EU-FP6)
- Chemicals and Solvents (Diper, Alemdar, Valeks, Polinas)

KBBE in Environment

- Aerobic and Anaerobic Wastewater Treatment (Sistem, Mass, Arbiogaz, Hidrotek, Artas ++)
- Composting (İSTACÇ, Ekolojik)

Potential for Growth in Environmental Biotechnology

- Turkey's Accession to the European Union would mean € 50-100 billion investment in environmental projects in the next 10 years. A significant portion would be invested in biological treatment facilities.
- Biotechnological alternatives such as bioremediation would be preferred over the conventional approaches such as incineration in the future.

A Strategic Analysis of KBBE for Turkey.....

■ Strengths

Biodiversity, Sizable Bioeconomy, Agricultural Land, Traditional fermentation products, Numerous Academic Institutions, Human Resources, New R&D Incentives and Funds, SANTEZ, Expatriate professionals, Innovative KBBE companies

■ Weaknesses

Lack of a Clear National KBBE Strategy, Limited Collaboration between Academia and Industry, Limited Commercialization of Innovation, Limited Seed and Venture Capital, Limited Role Models and Success Stories.

....A Strategic Analysis of KBBE for Turkey

■ Opportunities

Increasing Value of Agricultural Products and Food, Large Domestic and Regional Demand, Bio-Nanotechnology, Marine Biotechnology, FP7

■ Threats

Global Competition, Biosafety, Loss of Biodiversity

Strategic Priorities for Turkey

- Formation of a KBBE (Bioeconomy) Platform for Agriculture, Food, Chemicals, Energy and Environment.
- Centers of Excellence in Universities
- Entrepreneurship Programs in Universities and Technoparks
- Bio-incubators
- KBBE Sector Clusters
- Protection and Exploitation of Biodiversity
- FP7 Collaborations in KBBE

KBBE (Bioeconomy) Platform

- Provide A Medium for Interaction among the Stakeholders of Bioeconomy Initially in Istanbul, Ankara and Izmir
- Focus Primarily on the Biotechnology Applications in Agriculture, Food, Chemicals, Energy and Environment
- Develop Strategies for Rapid Growth of Knowledge Based Bioeconomy

Summary

- Biotechnology applications have been limited in areas outside of the traditional fermentation products, natural products and biological waste treatment in Turkey.
- Recent global developments have been influential in improving the importance of KBBE.
- The growing consumer market is demanding new bioeconomy products and services in Turkey.
- Strategic Leadership by KBBE (Bioeconomy) Platform may create visible results in the near to mid term.