

Republic of Turkey
Ministry of Food Agriculture and Livestock
General Directorate of Agricultural Research and Policy

R&D Studies of Ministry

2013



Research-Development and innovation are now the most important way to become mighty in the world

Recep Tayyip ERDOĞAN
Prime Minister

Agricultural sector is not application area of daily policies, on the contrary it is a strategic and economic sector excluded from populist approaching

Mehmet Mehdi EKER
Minister of Food Agriculture and Livestock



Content

- R&D in Turkey and the World
- Agricultural Research System
- Staff and Budget Structure
- R&D Programs
- Research Outputs
- Advanced R&D Centres
- New Planning Advanced R&D Centres



R&D in Turkey and the World



- The countries are mighty as much as created knowledge, developed technology and innovation.
- Turkey must make R&D for following reasons:
 - To compete with the other countries,
 - To develop her technology instead of import,
 - To cease dependence to developed countries,
 - to provide food security
- Developed countries allocate 2% of their Gross Domestic Products for the R&D.

Turkish Agriculture in World Ranking

Rank	GDP (2011)		Sıra	Agricultural GNP (2012)	
	Country	(Billion \$)		Country	(Billion \$)
1	USA	15,075,675	1	CHINA	515,8
2	China	11,299,987	2	INDIA	211,2
3	Japan	4,444,139	3	USA	165,0
4	India	4,420,563	4	INDONESIA	82,6
5	Germany	3,113,927	5	BRAZIL	82,1
6	Russia	2,383,364	6	JAPAN	71,3
7	Brazil	2,294,178	7	TURKEY	62,5
8	Great Britain	2,287,865	Increase in Agricultural GNP		
9	France	2,213,780	In 2002		11.
10	Italy	1,846,922	In 2009		8.
11	Mexico	1,666,531	In 2012		7.
12	South Korea	1,554,124			
13	Spain	1,405,787			
14	Canada	1,395,374			
15	Indonesia	1,124,631			
16	Turkey	1,075,467			

Countries' R&D / GDP Ratio

Country	Ratio (%)
Israel	4.28
Switzerland	3.62
South Korea	3.36
Japan	3.33
USA	2.88
EU	1.90
China	1.70
Russia	1.24
Turkey	0.84
Germany	2.78
France	2.21
UK	1.85

Source: OECD, Main Science and Technology Indicators

Aim of the countries' R&D expenditure (2020)	
EU	3%
South Korea (2014)	5%
China	2.5%
Finland	4%
Turkey (2023)	3%

R&D expenditures in Turkey have increased 4 fold as much as in the last decade.

The production amount of Horticulture in plant production

	Crop plants	Fruits	Vegetables	Total
2000	66.482	14.227	24.638	105.348
2005	75.461	15.983	26.472	117.916
2006	77.176	16.186	25.852	119.214
2007	70.286	15.556	25.661	111.503
2008	74.383	16.782	27.218	118.383
2009	80.368	17.725	26.780	124, 874
2010	90.580	17.915	25.997	134.492
2011	93.303	18.426	27.547	139.276

Source: <http://www.tuik.gov.tr>



Agricultural Research System

Agricultural Research System in Turkey



- **Ministry of Food Agriculture and Livestock**
General Directorate of Agricultural Research and Policy (47 agricultural research institutes)

Other Authorities made agricultural R&D except our ministry;

- **Ministry of Science, Industry and Technology**
The Scientific And Technological Research Council of Turkey

- **Universities**

○ Faculty of Agriculture	30
○ Faculty of Veterinary Medicine	25
○ Department of Food Engineering	38
○ Faculty of Fisheries	17

- **Private sectors and NGO's**

Research Organization of Ministry



- Plant Breeding and Agronomy
- Plant Health
- Livestock Breeding and Husbandry
- Animal Health
- Aquaculture and Fisheries
- Food and Feed
- Soil and Water Resources and Biodiversity
- Agricultural Economy



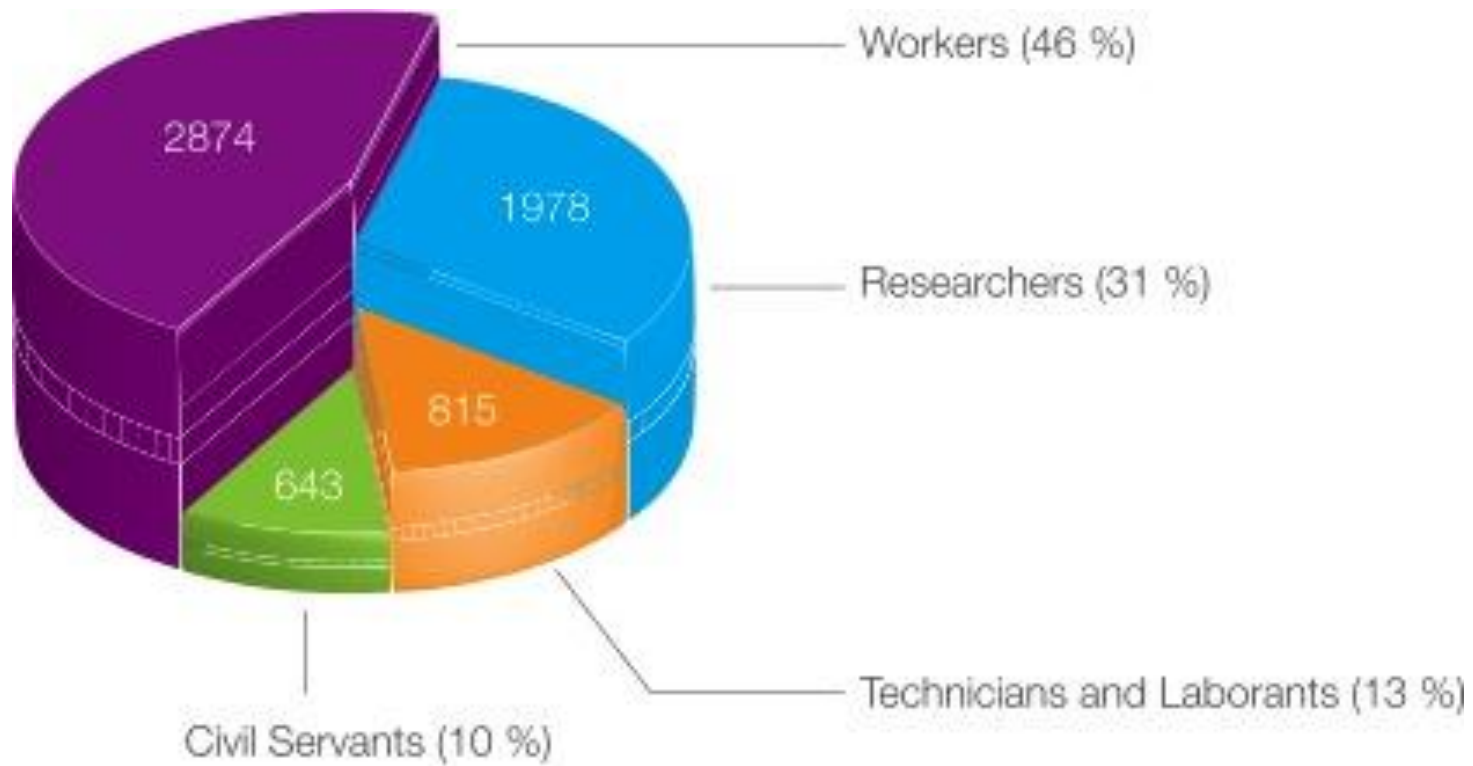
- To increase the yield and quality in plant and animal production,
- To develop new crops, varieties, breeding stocks and technologies for domestic and foreign market demands,
- To develop methods and techniques for plant and animal health and food safety,
- To protect and provide sustainable use of natural resources,
- To improve of research capacity (physical and human resources),
- To increase the national and international effectiveness of Institutes and their collaboration with stakeholders.



- To prepare the National Agricultural Research Master Plan
- To determine the research priorities and ensure resources to be used according to the priorities
- To monitor and evaluate research programs
- To publish research results and provide the use of developed technologies
- To prepare reports for policy makers to prevent likely crisis

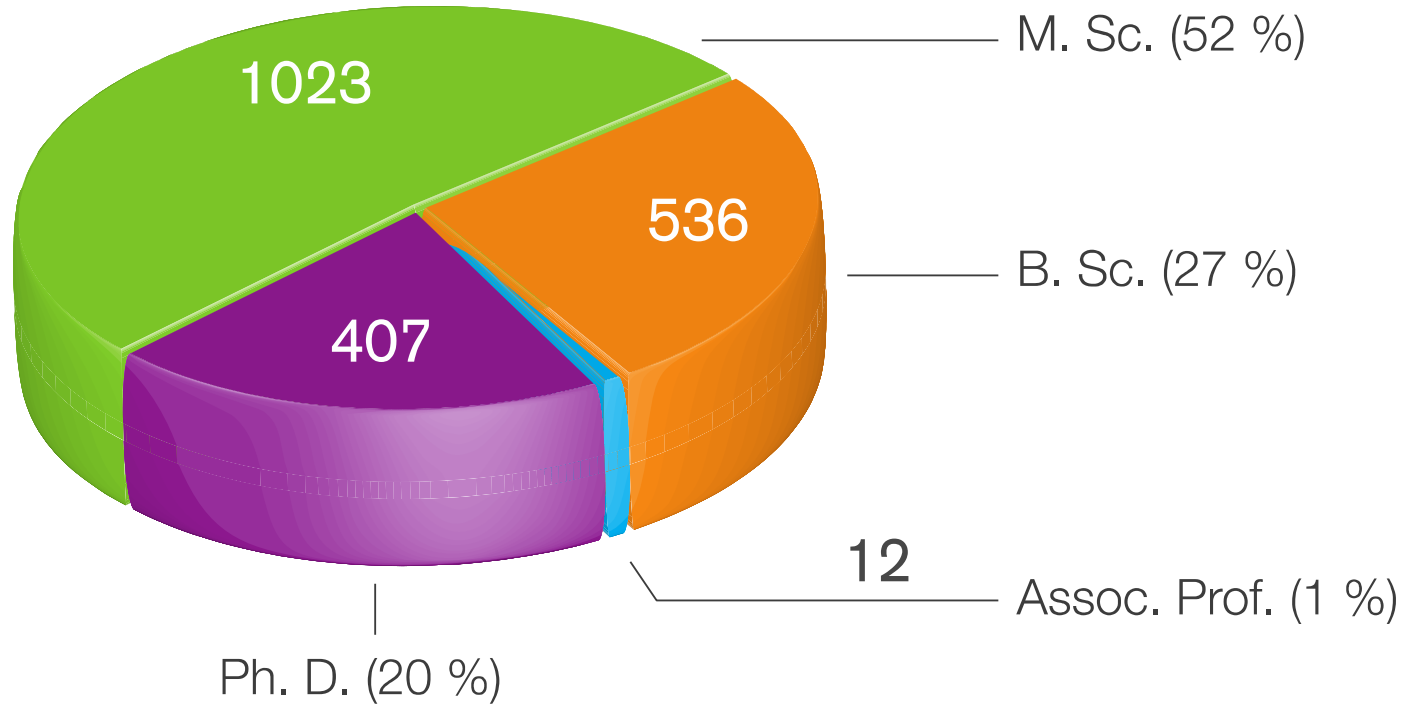


Personnel and Budget Structure



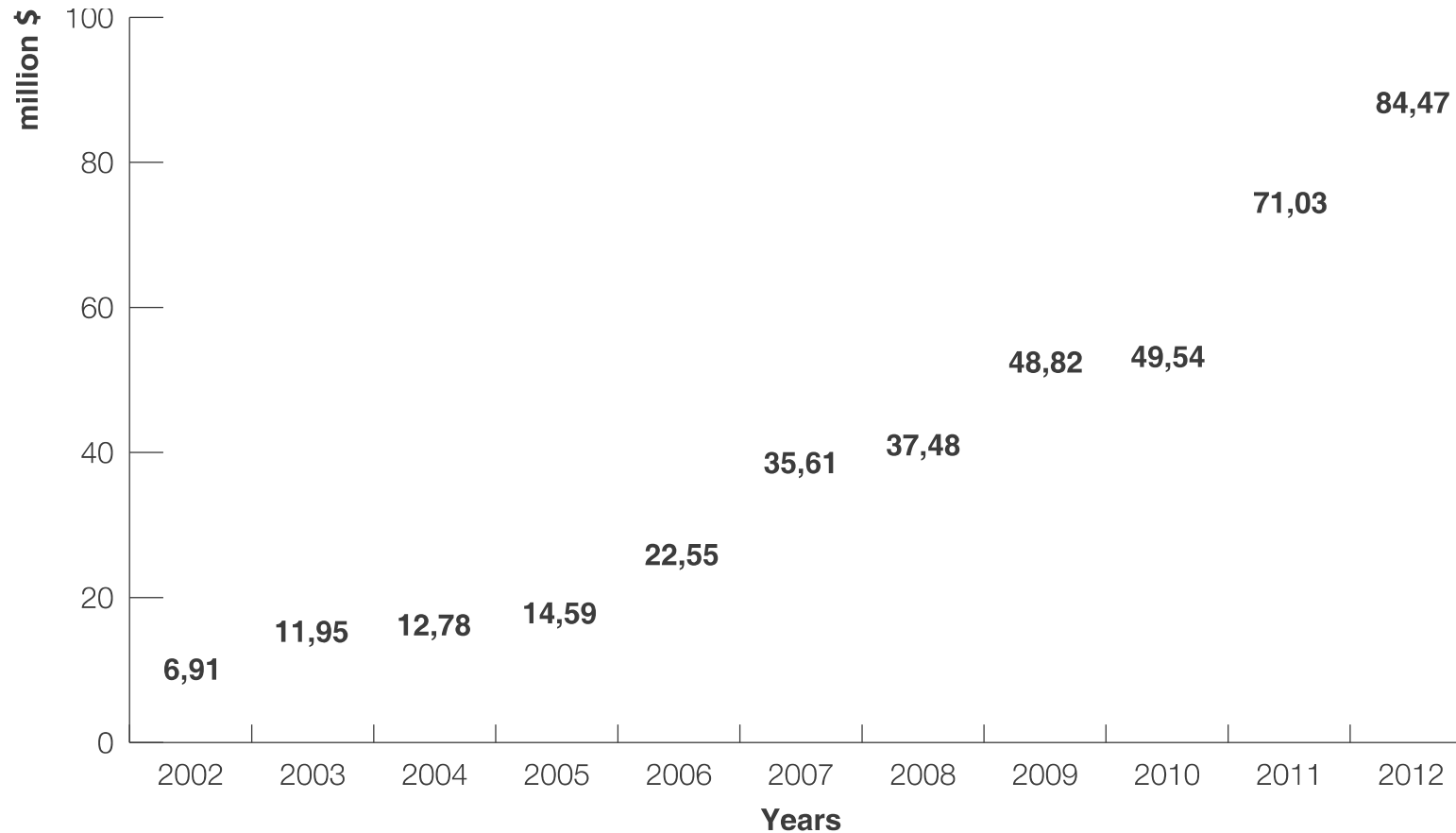
Total : 6310 Personnel

Qualifications of Researchers



To provide for personnel capacity improvement;

- National and international training courses
- Foreign language courses
- Contracted personnel employment



- R&D Budget is increased 13 times since 2002.
- Personnel expenditures are not included.



R&D Programs



In Research Institutes,
Approximately 1200 subproject
under 12 main projects has been
annually carried out and their
budget is 70 M TL. Approximately
250 projects are completed every
year.





- Plant production and plant diseases research project
- Protection of Plant biodiversity Project
- Establishment of base materials for Orchards-Vineyards Project
- Animal Production and Animal Diseases Research Project
- Anatolian Brown Cattle Improvement Project
- Project for Development of Grand Parents and Parents with Turkish Patents
- Aquaculture Research Project
- National Food and Feed Project
- Biosafety R&D Project
- Agricultural Economy Research Project
- Soil and water Resources Research Project
- National Botanic Garden Project

Community Based Animal Breeding Program



It is the first time in the Republic history; our Ministry has launched an animal breeding program on breeder conditions with Universities and producer's associations.

50 M \$ subsidy were given in 2012; and 70 M \$ subsidy is planned in 2013.

Program scope;

- Eighteen thousand rams and bucks was breeding
- Litter size were raised
- Live weight gain was increased to average 15% in weaning lambs
- Milk production gain was about 47% in Awassi sheep breed
- Anatolian Water Buffalo is included to the program.



Community Based Animal Breeding Program

Years	Breed Number	Province Number	Farmer Number	Animal Number
2006-2010	10 Sheep, Two Goats	13	500	80.000
2011-2016	24 Sheep, Five Goats	71	7.000	1.100.000
2012-2016	Anatolian Water Buffalo	17	4.000	20.000



	Nr. of Institutes	Species/Breed/Line	Nr. of Accessions
Seed Gene Bank	2	3.390 species	86.619
Fruit and Grape Field Gene Bank	16	60 species	9.306
Animal Genetic Resources	7	13 races 3 lines	1.939 50 colonies 3 Silkworm lines
Animal Gene Bank	2	5 species 30 lines	88.484 Embrios
Community Based Protection	23 provinces	23 races	10.523 8.000 colonies

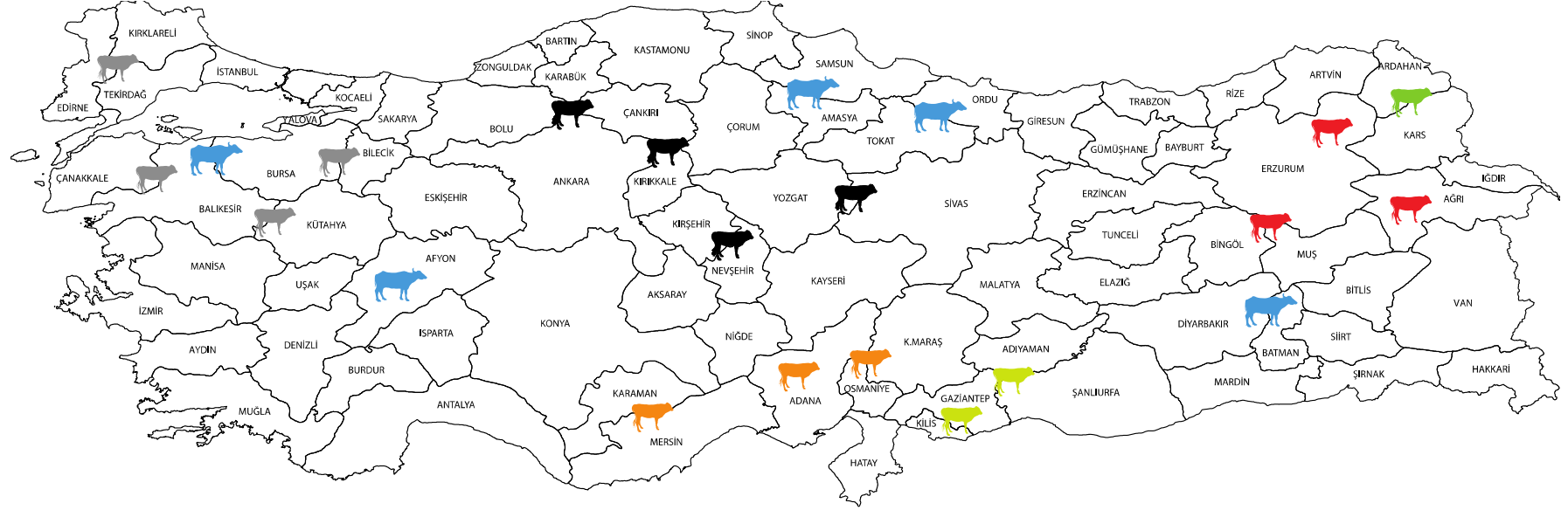
In our Country;

- More than 12.000 plant species are present
- Almost 4.000 of them are endemic
- They are registered and studies on their protection are continued

Registered animal species;

- 53 native race, species, lines and hybrids have been registered

Animal Genetic Resources Conservation Program



Native Black Cattle



Anatolian Gray Cattle



Anatolian Water Buffalo



South Anatolian Red (Kilis)



East Anatolian Red



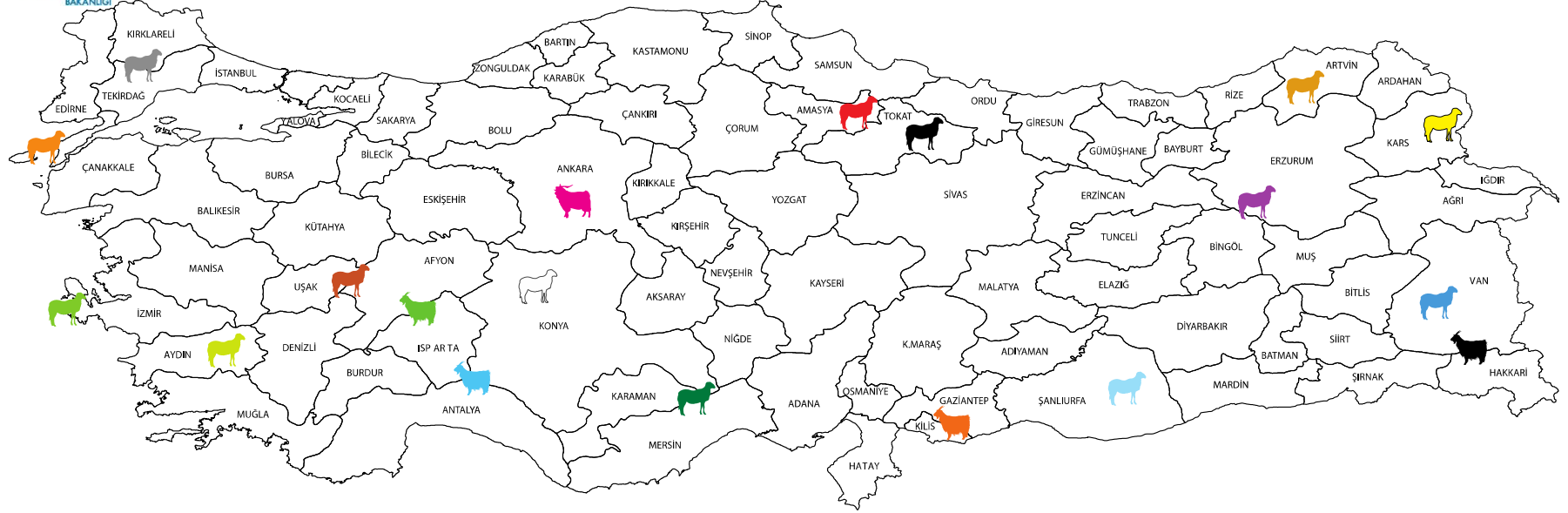
Native Southern Yellow



Zavot



Animal Genetic Resources Conservation Program



Sakız (Chios)



Çine Çaparı



Gökçeada (İmros)



Kıvırcık



Herik



Hemşin



Norduz



Dağlıç



Güney Karaman



Karagül



Mor Karaman



İvesi



Akkaraman



Tuj



Ankara Keçisi



Honamlı Keçisi



Kilis Keçisi



Kıl Keçisi



Norduz Keçisi

Private Sector R&D Support Program



- Support program in the directions of Ministry and relevant sector requirements has been conducted for private sector, NGO and Universities.



- from this program, 452 project offers were taken in 2007-2012, **115** of them were supported and financed with **12.4 M TL**.

Institutes-Private Sector Collaboration Program

- Institutes' infrastructure was opened to R&D activities of Private sector, NGO and Universities.
- in this concept, **127** projects with **9.7 M TL** budget, most of them related to private sector and NGO, have been carried out.



Institutional Collaboration Programs



Our ministry is collaborating with following institutions;

- **Turkish Atomic Energy Authority** for producing of new cultivars by mutation breeding for 27 projects.
- **National Boren Research Institute** for researching of the opportunities to the use of the natural sources for plant and animal production in 9 projects.
- **General Directorate of Turkish Coal Enterprises** for researching of the opportunities in plant nutrition in use of the natural sources (humic acid) at the 9 projects.
- Moreover; education, implementing and infrastructure projects in the different countries **are carried out** with collaboration of **the Turkish International Cooperation and Development Agency**.





1001-1002 Supporting Program

•**53** projects, 41 of them completed and 12 of them carrying on, has been carried out between 2002 and 2012 by our ministry. Total budget of them is **5.2 M TL**.

1003 Supporting Program

•TUBITAK has launched a new program concerning race breeding and increasing of domestic seed production and Energy plants in 2012. Seventy eight projects applied by our Institutes are being evaluated.



1007 Supporting program

At the first term (2005-2011),

Our ministry;

- is in the first rank with 36 projects
- is in the second rank with 73.9M TL
- 23 projects of them were completed and the others are carried on.



At the second term (2012-2016),

- our ministry has determined 19 R&D Title and sent to TUBITAK. Seven of them were started in 2012.



- International winter wheat improvement program has been carried out under the leadership of Turkey, with **CIMMYT** and **ICARDA**.
- Breeding materials are sent to approximately 150 institutions from 55 countries every year.
- In this context, 46 cultivars have been developed and registered. These cultivars are used about 2 M hectares in the World.



- The joint projects are carried out aim to preventing of nematode damage in wheat with **CIMMYT**
- Activities related to establishment of Regional Rust Diseases Research Centre in İzmir are sustained with **ICARDA**
- Activities on development of Blight-resistant rice are performed with **IRRI**; and exchange of genetic material is maintained.
- Sharing of statistical data in agricultural research is realized with **IFPRI**.



FAO and Other International Organizations

- Our ministry put into practice 14 protects in the collaborating with **FAO**.
- Five projects supported by Sub Regional Office are put into practice.
- Collaboration with Economic Cooperation Organization is continued in seed sector.
- Cotton research coordination in the Islamic countries is carried out by collaboration with the Organisation of Islamic Cooperation.
- Projects on turbot production and wheat breeding are performed by collaboration with Japan International Cooperation Agency.



- Collaboration in 28 projects has been realized in FP 6 and 7.
- Three projects (cotton, nut and bee) have been put into practice in IPA Total budget of these projects are 16.7 M €.



Binary Cooperation Programs



- Seventeen research projects have been launched in accordance with Joint Protocol signed by KKTC on Research Area in 2009.
- Eleven research projects have been prepared in accordance with joint Collaboration Agreement in Agricultural Area with The Netherlands.
- One project on zoonoz diseases has been carried out with Italy.
- Joint projects on agricultural issues have been conducted with the other countries and activities on expert training and material exchange have been realized by our Ministry.



Research Outputs



Domestic Plant and Animal Genetic resources are protected,



First domestic potato variety is developed and submitted for registration,



The use of domestic F1 hybrid vegetable seeds is reached to 45%,



Dwarfed Fruits and Kiwi are introduced to Turkish agriculture,



Half of the registered varieties in field crops are developed,



Exporting rice hull seeds while being an importer in a short time ago,



Seedless lemon is developed and submitted to registration,



Production of Wheat is increased although the cultivation area is decreased,



Hulless barley is improved for diet and for submitted to registration,



Mobile Solar Irrigation Machine is developed and put forward to patent,



Advanced technology centres are established,



Private sector participation in R&D studies is supplied,



Layer hens are developed



Precision Agriculture technologies providing input efficiency are developed,



The infrastructures of laboratories are improved and accredited,



New species are domesticated for aquaculture sector,



New maize variety (alternative to GMO seeds) is developed against Corn stalk borer,



Air assisted field sprayer is developed for an alternative to aerial spraying in control of Sunn pest.



Three native enzymes are developed as feed supporting additive at the first time and put forward to patent,



Common and sustainable network is established by determining national food context,



Roll, pack goods and silage machine are developed and registered the useful model



Animal vaccines production technologies like foot-and-mouth disease, Brucella, PPR and smallpox vaccine are developed,

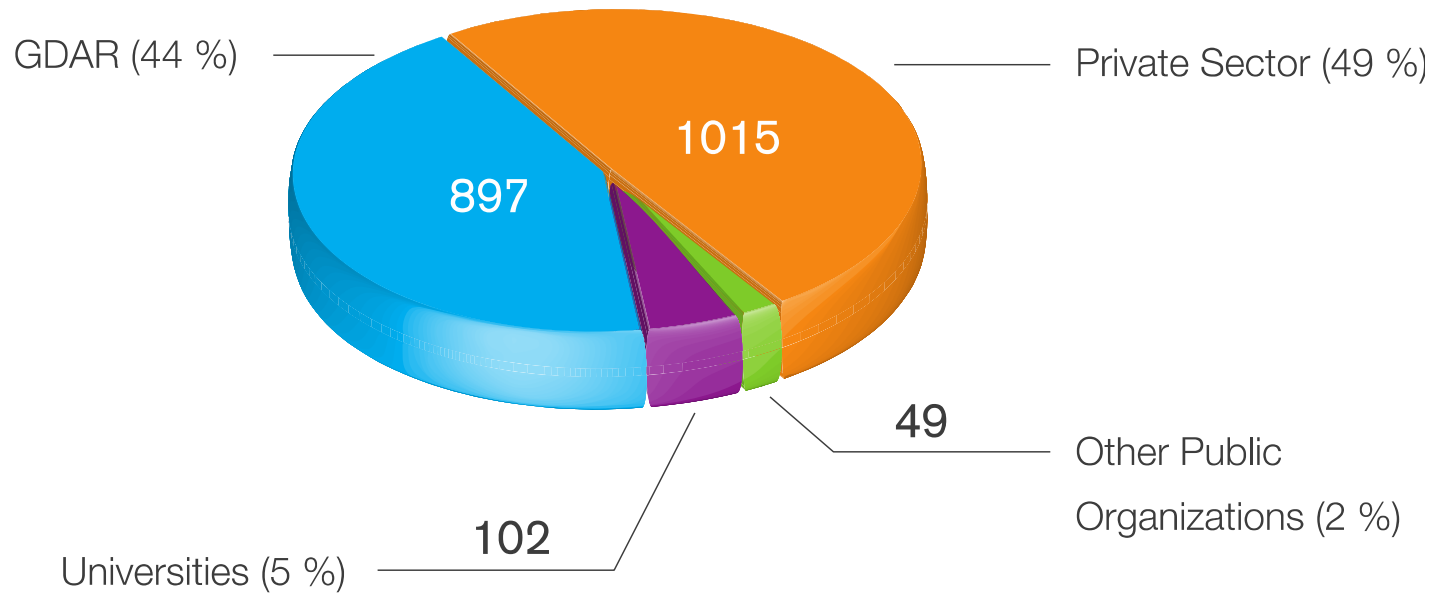


Advanced diagnostic methods are provided to use in our laboratories



Biological control and biotechnical methods as an alternative to chemical control developed, such as the bait trap against leaf rollers in cherry.

Distribution of Registered Seed Varieties



Total: 2063 Varieties

Proportion of Our Varieties Used in Production

This table shows the percentage of the varieties generated by GDAR Research Institutes used in production

Variety	Rate (%)	Variety	Rate (%)
Bread Wheat	95	Chick-pea	100
Durum Wheat	98	Lentil	100
Barley	99	Cucumber	100
Rice hull	100	Eggplant	55
Trefoil	100	Tomatoes	50
Vetch (<i>Vicia villosa</i>)	100	Pepper	30
Vetch (<i>Vicia narbonensis</i> L.)	100	Hybrid vegetable	45
Safflower	100	Soybean	30
Peanut	100	Sunflower	20
Sesame	100	Clover	20

Outputs from researches supply the needs of relevant institutions including universities and supply a base for their studies.

Research Topics and Ministries benefited from these outputs

Subjects	Ministries
Erosion	Ministry of Forestry and Water Issues
Biodiversity	
Integrated Watershed Management	
Fisheries	
Climate change	Ministry of Environment and Urban Planning
Environment and land use planning	
Renewable energy resources	Ministry of Energy and Natural Resources
Rural development	Ministry of Development

Trainings		Number of Trainings	Number of Participants
In-service training (technical staff)	GDAR	258	1814
	Common Trainings with Other Units	61	3805
Foreign Language Course	ICARDA-CIMYYT	1	69
	on-site training (40% - 60%)	18	161
Researchers Training		13	460
Turkish Farmer Organization (2010)		5	262
ACC (Agricultural Credit Coop.)		1	66
TOTAL		357	6637

*TCAU: Turkish Agricultural Cooperation Union
ACC: Agricultural Credit Cooperation



ADVANCED R&D CENTERS



The third biggest Seedling Gene Bank of the world was opened within the body of Field Crops Central Research Institute in Ankara in 2010.

The Bank has the capacity of

- 250,000 seedling samples,
- 60,000 herbarium sample.





- The centre was opened within the body of Agricultural Research Institute of the Western Mediterranean in Antalya in 2010 and equipped with ultra-modern equipment is composed of 7 laboratories.
- Laboratories have the capacity of analysis of 10.000 samples per year.
- Potential species are taken into culture; breeding techniques and chemical contents of the species used for medical purposes are determined.



- The centre was established in Bahri Dağdaş International Agricultural Institute, Konya in 2010.
- The centre was established to conduct studies for the seed production against risk of drought due to global warming.
- Three laboratories, rain shelter, 3 greenhouse equipped with computer and growth chamber occur in the centre.



BULL TEST CENTRE and GENE BANK



The Bull Test Centre was established in Lalahan Livestock Central Research Institute, Ankara in 2011.

- The bulls obtained from the Anatolian Alaca Development Project are tested.
- The capacity of sperm production: 2 million dosage/ year.

The Gene Bank,

Genetic materials (sperm, embryo, DNA) belonging to 5 species and 30 races are preserved.



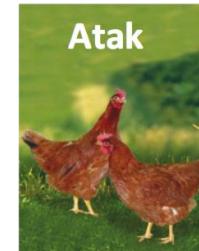
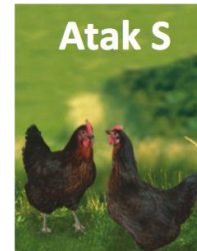
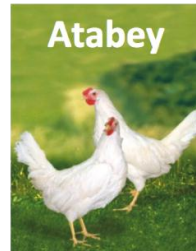
Embryo Transfers and Genetic Laboratory,

- Trainings in embryo transfer (ET)
- Biotechnological studies in paternity test, ET and sex determined embryos in vitro Fertilization are performed.
- Laboratories are equipped with advanced technology.



The centre was opened within the body of Ankara Poultry Research Station in 2011.

- **Domestic layer parental lines, white and two brown**, giving best yield have been developed under the country conditions.
- The studies are continuing on getting the attraction of private sector and **extending the usage** of these lines.
- Infrastructure has been established to supply the needs of layer breeders of the country in the institute.



Agricultural Energy Research Centre



It was established within the body of the Blacksea Agricultural Research Centre in 2011 in Samsun

The Aim of the Centre;

- Crops not used for food and agricultural wastes
- Forest products (leaf, sawdust etc.)
- To develop biofuels production technologies from algae
- To test their suitability with the standards.



International Agricultural Research and Training Centre



In the centre opened in Izmir in 2009;

- Training activities are organized in cooperation with international organizations such as TIKa, ISEDAK, ICARDA and FAO.
- Thirty three international activities such as meeting, training and workshop have been organized for last three years.
- Nine hundred experts from 70 countries participated in these activities.



GAP International Agricultural Research and Training Centre



In GAP International Agricultural Research Institute;

- Opened in September, 2012.
- In the centre, trainings will be given to farmers and technical staff coming from countries in the region.





New R&D Centres to be Established

National Botanical Garden in Turkey

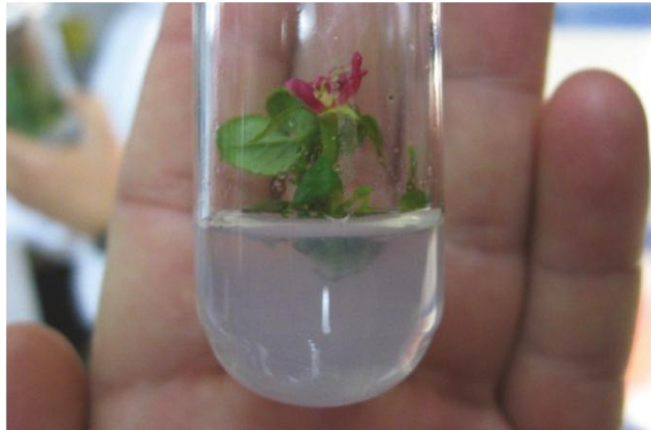


The foundation of Turkish National Botanical Garden on **220 ha** area will be established near the campus of our Ministry in Ankara on Eskişehir road between Bilkent and Hacettepe Universities.

In the garden;

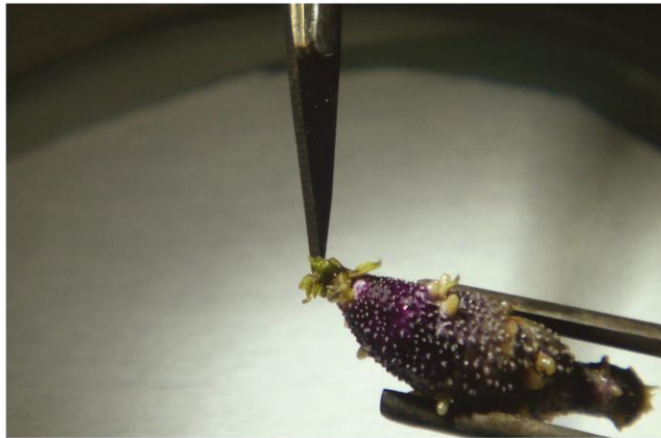
- Endemic plants area
- Plant court, production and exhibition greenhouses
- Plant museum and herbarium
- Research fields, arboretum and nature park
- Turkey Geophyte Garden
- Research laboratory and landscape design studios will take place.
- Project and consultancy tenders have been completed,
- Tenders for construction will be initiated.





The centre will be established within the body of Aegean Agricultural Research Institute in İzmir. In the established centre;

- For the purpose of fast reproduction by tissue culture, production of prebasic improvement plants material, plants that do not reproduce or difficult to reproduce by seed;
- in potato group, 300.000 mini-tubers per year,
- in group of ornamental plants, 200.000 seedlings and grafting per year,
- in fruit group, also 100.000 clonal rootstock materials per year will be aimed to produce by tissue culture.
- laboratory infrastructure of the centre has already been completed and planned to open in 2013.



The centre will be established within the body of Field Crops Central Research Institute in Ankara, In the centre, biotechnological methods will be used for the aim of;

- Shortening the time in the studies of plant breeding and development of new varieties, which take long time,
- Increasing the breeding efficiency by genetic characterization,
- Providing trainings of researches who will study at this field,
- Development capacity of usage of biotechnological methods.
- The establishment of infrastructure has been started in 2012 and it will be planned to open in May, 2013.

Farmer Training Centre



In the centre which will be established within the body of GAP Agricultural Research Institute, Şanlıurfa;

- To farmers of our country and regional countries, practical training will be given in all agricultural matters particularly in irrigation.
- The centre will be planned to open in 2013.



Geophyte Garden in Turkey



Geophyte Garden will be established in Atatürk Horticultures Central Research Institute in Yalova. It is aimed to conserve genetic resources composed of native bulbs and tubers of ornamental plants and gain them for trade.

- It will be the largest one in temperate climate zone in the world in terms of number of species.
- Seven hundred fifty species (40 % endemic) in flora of Turkey have been preserved.
- The centre will be planned to open in 2014.



Increase of the biological control opportunity is aimed by establishing the centre within the body of Biological Control Research Station into toward the strategic plan of our Ministry.

For this purpose in the centre;

- New biocontrol agents against the diseases and pests which give damage to cultured plants will be determined
- Procedures and methods to control harmful organisms of these agents will be presented.
- Mass production of biological control agents will be made.

Therefore;

- Pesticide use and costs will be reduced for Plant Protection.
- Pesticide residue problem in agricultural products will be solved.
- Protection of the environment and the natural balance will be taken under guarantee.



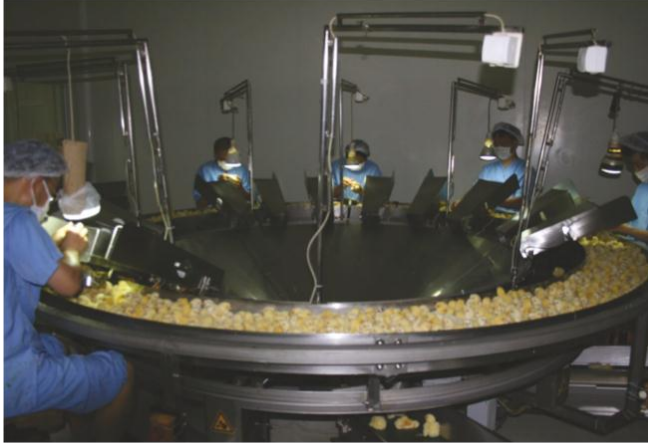
In the centre which will be established within the body of East Anatolia Agricultural Research Institute;

- By considering detrimental effect of global climate change, studies will be done for seed production,
- Especially in cold resistance of cereals will be tested,
- New varieties resistant to cold will be developed.



In the centre;

- Two laboratories,
- Computer equipped 2 greenhouse
- Growth chambers will be established.



In the centre within the body of Passage Zone Agricultural Research Institute, Eskisehir;

- Meat parental hen lines will be improved by breeding studies,
- Our country's dependence on foreign countries will be reduced in this regard,
- In this context, hatcheries, pure-line units, slaughterhouses and testing coops will be constructed.
- Infrastructure is going to be completed in 2013 and breeding studies will be started in 2014.



The centre will be established within the body Eastern Mediterranean Agricultural Research Institute, Adana. In the centre, targets are determined as follows;

- by establishing the molecular biology and biotechnology laboratory infrastructure;
- 50-60 % shortening of breeding time by using modern breeding methods,
- Getting faster and more reliable results
-

For this purpose;

- Special rooms for processing and storing the breeding material,
- Climatized and isolated greenhouses will be established for gaining the generation and reproducing the seeds.



In the centre within the body of Bandırma Sheep Research Station;

- Performing of breeding studies at molecular level with biotechnological and genetic applications with the aim of increasing the yield and quality on livestock,
- For the purpose of domestic animal genetic materials preservation as freezing and their usage, banks of sperm and embryo are aimed to be founded.
- In addition, genetic studies like artificial insemination, embryo transfer, paternity test will be performed in the centre.

Our main target for Turkey is to;

- be among the **top 5 Countries** in the World in Agricultural Economy,
- have an Agricultural GDP of **150 Billion USD**,
- keep its **sustainable growth**,
- have agricultural export over **40 Billion USD**,
- be an arbiter in the World and its region for Agricultural **R&D**.



Foresights about the future of Turkish agriculture stand out in the following headings

- ✓Quality standards and food security in agriculture will be important. For this reason, capacity and quality of enterprise will increase while reducing its number.
- ✓Through the planned arrangements the competitiveness of products will increase in foreign markets.
- ✓Especially fresh fruits and vegetables will gain importance.
- ✓Organized farming zones will be created.
- ✓The contracted production and organic farming will come to the forefront.
- ✓Government support for R & D investments will increase.
- ✓The majority of investors will turn to high-tech agricultural activities.

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