National Research Centre
Cairo, Egypt

Prof. Dr. Ashraf Shaalan
President, NRC
info@nrc.sci.eg
60th Year Anniversary

60 years of supporting the national economy

Since 1956

To 2016
Since 1956

- 12 Feddans (51000 m²).
- 11 Research buildings.
- 2 Administration buildings.
- 10 Store rooms.
- Animal houses.
- Green houses.
- 5 Experimental stations.
- Research farm 350 feddans.
- 14 Research Division
- 109 Research Department

NRC 2016
NRC

The major multi-disciplinary
R&D Institute in Egypt

- Devoted to basic and applied research.
- The largest of all institutions affiliated to the Ministry of Scientific Research.
- Employs 70% of all scientists working in these institutions.
- Correspond to the country’s key production and services sectors.
NRC Mission

Conduct Basic and Applied Research

In

Different Fields of Science and Technology

To

Strengthen the National Economy
NRC Objectives

Contribute
• Contribute in national upgrading of science & dissemination of knowledge

Guide
• The National Economy

Strengthen
• scientific linkages and cooperation with local and international organizations

Provide
• scientific services and consultations

Training
• Graduate students
Organization Structure
Organization structure

President
with ministerial status

Vice President for Research
Vice President for Technical Affairs
Deans of 14 Research Divisions
Organization Structure (cont.)
Research Divisions

- Environmental Sciences
  - Oral and Dental Research
- Inorg. Chem. Ind. and Mineral Resources
- Org. Chem. Industries
  - Genetic Engineering & Biotechnology
- Medical Sciences
  - Textile Industries
  - Engineering Research
  - Agriculture & Biology
  - Physics
- Human Genetics & Genome
  - Food Ind. and Nutrition
  - Pharmaceutical Industries
  - Veterinary Research

Health and Environment
Industrial Research
Agriculture and Biology
Basic Science
Man Power

- Research staff: 3150
- Scientific assistance: 1650
- Administrative staff: 2560

Total: 7360
Research and Development

Research and Development Projects

*NRC* activities are *customer-oriented* in order to address the national needs more effectively through scientific and technical research.
Customer-Oriented
Addressed to national needs

1- In-house projects - Governmental budget (18%): 9th plan (2010-2013)
2- National projects – contracts (30%)
3- International projects (52%)
Current Strategy

- Advanced Basic Scientific Research
- Interaction with Production and Service Sectors
- International Relations
What is new in the 60th Years Anniversary

ISO 9001 Certified
(April 2016)
What is new in the 60th Years Anniversary

- Advanced materials
- Medical Sciences
- Human Genetics
- Influenza Virus
- Textile Industries

5 Centres of Excellency
What is new in the 60\textsuperscript{th} Years Anniversary

- New NRC Branch in 6\textsuperscript{th} of October City
- Upgraded Experimental Park in Noubarya
- Model Farm in Sinai
What is new in the 60th Years Anniversary

8–Flours Building for Advance Research

Outstanding Incentives for Research Staff
What is new in the 60th Years Anniversary


Egyptian – Italian Partnership

Egyptian – Indian Partnership
Major Activities

The 11th Research Plan

2016 – 2019

104 Research sub-axes
9 Research Fields
22 Research Axes
9 Research Field
22 Research Axes
104 Research Sub-axes
## 1- Human Health

<table>
<thead>
<tr>
<th>Main Axes</th>
<th>Sub-axes</th>
</tr>
</thead>
</table>
| 1.1. Human medical researches | 1.1.1. Early detection of chronic diseases, cancer and autoimmune diseases among high risk individuals.  
1.1.2. Identification of new Biomarkers with high quality or lower cost and time for diagnosis & assessment of disease prognosis.  
1.1.4. Prevention, diagnosis and treatment of genetic diseases  
1.1.5. Fetal and maternal health  
1.1.6. Stem Cell research.  
1.1.7. Infectious Diseases (Early detect and treatment of virus C)  
1.1.8. Geriatric health  
1.1.9. Occupational diseases and early detection  
1.1.10. Health effects of environmental pollution  
1.1.11. Health awareness  
1.1.12. Drug addiction and treatment  
1.1.13. Mummies, their skeletons and nucleic acid studies |
# 1- Human Health

<table>
<thead>
<tr>
<th>Main Axis</th>
<th>Sub-axes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.2. Dentistry</td>
<td>1.2.1. Stem cells</td>
</tr>
<tr>
<td></td>
<td>1.2.2. Nanotechnology</td>
</tr>
<tr>
<td></td>
<td>1.2.3. Polymers and natural materials</td>
</tr>
<tr>
<td></td>
<td>1.2.4. Removable and fixed processes</td>
</tr>
<tr>
<td></td>
<td>1.2.5. Dental genetics</td>
</tr>
</tbody>
</table>
## 1- Human Health

<table>
<thead>
<tr>
<th>Main Axis</th>
<th>Sub-axes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.3. Pharmaceutical and drug researches</td>
<td>1.3.1. Assessment of natural products against cancer, autoimmune and chronic diseases.</td>
</tr>
<tr>
<td></td>
<td>1.3.2. Synthesis of pharmaceutical compounds with biological activities</td>
</tr>
<tr>
<td></td>
<td>1.3.3. Chiral separation of enantiomers in pharmaceuticals</td>
</tr>
<tr>
<td></td>
<td>1.3.4. New methods for the analysis of pharmaceutical products</td>
</tr>
<tr>
<td></td>
<td>1.3.5. Recent developments and their application in the industry of pharmaceutical formulations</td>
</tr>
</tbody>
</table>
## 1- Human Health

<table>
<thead>
<tr>
<th>Main Axis</th>
<th>Sub-axes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.4. Development of diagnostic kits</td>
<td>1.4.1. Development of diagnostic Kits &amp; supplement (Media, Growth Factors, IL, ... etc)</td>
</tr>
<tr>
<td></td>
<td>1.4.2. Production of primers and probes for genetic mutation detection</td>
</tr>
</tbody>
</table>
## Animal Wealth Development

<table>
<thead>
<tr>
<th>Main Axes</th>
<th>Sub-axes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>2.1. Animal, poultry, and fish production</strong></td>
<td>2.1.1. Ruminant development</td>
</tr>
<tr>
<td></td>
<td>2.1.2. Management of low fertility in animals</td>
</tr>
<tr>
<td></td>
<td>2.1.3.Fishery, poultry, and farm animals' production through genetic improvement</td>
</tr>
<tr>
<td></td>
<td>2.1.4. Identification of animal, poultry, and fish breeds with a natural resistance to diseases through genetic selection.</td>
</tr>
<tr>
<td></td>
<td>2.1.5. Improvement of the applications of artificial insemination and sire selection in farm animals under local conditions.</td>
</tr>
<tr>
<td><strong>2.2. Diseases diagnosis and control</strong></td>
<td><strong>2.2.1. Development of veterinary diagnostic kits</strong></td>
</tr>
<tr>
<td></td>
<td><strong>2.2.2. Vaccines &amp; sera development &amp; production from local strains.</strong></td>
</tr>
<tr>
<td></td>
<td><strong>2.2.3. Zoonotic diseases</strong></td>
</tr>
<tr>
<td><strong>2.3. Alternative veterinary medicine</strong></td>
<td><strong>2.3.1. Medicinal and aromatic plant extracts</strong></td>
</tr>
<tr>
<td></td>
<td><strong>2.3.2. Antibiotic substitutes</strong></td>
</tr>
<tr>
<td></td>
<td><strong>2.3.3. Probiotics</strong></td>
</tr>
<tr>
<td></td>
<td><strong>2.3.4. Bee products</strong></td>
</tr>
<tr>
<td></td>
<td><strong>2.3.5. Biological control</strong></td>
</tr>
</tbody>
</table>
3- Increase and raise of the efficiency of agricultural production

<table>
<thead>
<tr>
<th>Main Axis</th>
<th>Sub-axes</th>
</tr>
</thead>
</table>
| 3.1. Agriculture | 3.1.1. Biotic and Abiotic stress  
3.1.2. Increasing productivity of cereal, oil, sugar, legumes and forage crops  
3.1.3. Increasing productivity of horticultural crops and postharvest technology (vegetables, fruits, ornamental, woody plants and medicinal and aromatic plants)  
3.1.4. Increasing productivity of some promising crops (Gatrova, Jojoba, Moringa, polonia, Sisal, Cassava, Japanese Berry)  
3.1.5. Increasing productivity of livestock, poultry and fish  
3.1.6. Genetic improvement of farm animals (ruminants - poultry - fish)  
3.1.7. Genetic improvement of wheat resistance to salinity, drought and diseases  
3.1.8. Plant biotechnology application  
3.1.9. Applications of biotechnology in animal production (Ruminants - poultry - fish)  
3.1.10. Integrated pest management - plant diseases  
3.1.11. Integrated rural development  
3.1.12. Cleaner production in agriculture |
### Food Safety

<table>
<thead>
<tr>
<th>Main Axis</th>
<th>Sub-axes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>4.1. Functional Foods</strong></td>
<td><strong>4.1.1. Natural, processed and flavored food &amp; drinks used in disease Prevention and therapeutic</strong></td>
</tr>
<tr>
<td></td>
<td><strong>4.1.2. Development of flavours and food additives from natural resources</strong></td>
</tr>
<tr>
<td><strong>4.2. Food safety</strong></td>
<td><strong>4.2.1. Bio and organic production of horticultural crops</strong></td>
</tr>
<tr>
<td></td>
<td><strong>4.2.2. Food production, transportation, and handling</strong></td>
</tr>
<tr>
<td><strong>4.3. Cleaner production</strong></td>
<td><strong>4.3.1. Cleaner food production through health controls on products of animal origin.</strong></td>
</tr>
<tr>
<td></td>
<td><strong>4.3.2. Detection of meat, milk and other foodstuffs adulteration.</strong></td>
</tr>
<tr>
<td></td>
<td><strong>4.3.3. Identification of hormonal residues, heavy metals and insecticides in foods of animal origin.</strong></td>
</tr>
</tbody>
</table>
# 5- Renewable Energy

<table>
<thead>
<tr>
<th>Main axis</th>
<th>Sub-axes</th>
</tr>
</thead>
</table>
| 5.1. Renewable Energy | 5.1.1. Solar energy and solar cells  
5.1.2. Wind energy  
5.1.3. Hydrogen  
5.1.4. Biofuel  
5.1.5. Systems of energy generation, storage and control  
5.1.6. Lithium battery  
5.1.7. Fuel cells |
### 6- Water

<table>
<thead>
<tr>
<th>Main Axis</th>
<th>Sub-axes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>6.1.2. Recycling</td>
</tr>
<tr>
<td></td>
<td>6.1.3. Rational use of water</td>
</tr>
<tr>
<td></td>
<td>6.1.4. Desalination</td>
</tr>
<tr>
<td></td>
<td>6.1.5. Membranes development and evaluation</td>
</tr>
<tr>
<td></td>
<td>6.1.6. Waste Management</td>
</tr>
</tbody>
</table>

![Industrial wastewater treatment 2013](image)
<table>
<thead>
<tr>
<th>Main Axis</th>
<th>Sub-axes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>7.1. Environmental researches</strong></td>
<td>7.1.1. LASER, and nanotechnology applications in air and physical pollutions</td>
</tr>
<tr>
<td></td>
<td>7.1.2. Development of effective low-cost materials for removing hazardous contaminants from water</td>
</tr>
<tr>
<td></td>
<td>7.1.3. Advanced or new technologies to remove pollution from industrial and sewage water</td>
</tr>
<tr>
<td></td>
<td>7.1.4. Sensors for climate changes</td>
</tr>
<tr>
<td></td>
<td>7.1.5. Sensors for pollutants</td>
</tr>
<tr>
<td><strong>7.2. Waste Management</strong></td>
<td>7.2.1. Management and/or recycling of solid and liquid wastes</td>
</tr>
</tbody>
</table>
## 8. Proper Utilization of Natural Resources

<table>
<thead>
<tr>
<th>Main Axis</th>
<th>Sub-axes</th>
</tr>
</thead>
</table>
| 8.1. Raw materials and mineral resources | 8.1.1. Applications of geophysics  
8.1.2. Enhancing the efficiency of productivity |
| 8.2. Conservation of germplasms | 8.2.1. Conservation of medicinal plants  
8.2.2. All other disciplines |
| 8.3. Climate changes | 8.3.1. Impact on agriculture production and soil  
8.3.2. Impact on health and epidemics  
8.3.3. Biodiversity and environment  
8.3.4. Water resource and water consumptive use |
9- Innovation in industrial development and enhancement of its competitiveness

<table>
<thead>
<tr>
<th>Main Axis</th>
<th>Sub-axis</th>
</tr>
</thead>
</table>
| 9.1. Product/service-oriented projects | 9.1.1. Intermediates chemical, auxiliaries, and functional colorants  
9.1.2. Generation of ozone  
9.1.3. Polymers, biomaterials, and synthetic materials  
9.1.4. Technical and smart textiles and composites  
9.1.5. Technological systems in production sectors  
9.1.6. Safe data transfer  
9.1.7. Software Programs  
9.1.8 Food industry  
9.1.9. Development in agricultural machinery  
9.1.10. Mechatronics (product design or product depends on integration of mechanical and electronic systems  
9.1.11. Cleaner production in industry |
9. Innovation in industrial development and enhancement of its competitiveness

<table>
<thead>
<tr>
<th>Main Axis</th>
<th>Sub-axes</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.2. Carbon Nanotubes</td>
<td>9.2.1. Preparation, characterization, and application</td>
</tr>
</tbody>
</table>
| 9.3. Applications of Frontier Sciences | 9.3.1. Nanotechnology  
9.3.2. Information technology  
9.3.3. Biotechnology  
9.3.4. New Materials  
9.3.5. Nano-biotechnology  
9.3.6. Semiconductors  
9.3.7. Biomaterials |
| 9.4. Upgrading of research outputs of 10th Research Plan | 9.4.1. Research proposals illustrate the urgent need for action to reach for the manufacture of a final product of the tenth plan research outputs. It should proposed summary of the research presented in this axis contains a clear scientific justification to show the expected return from the application of obtained results in the previous plan during eleventh research plan |
# Applied Research Outputs within the past 12 Months

<table>
<thead>
<tr>
<th>Field</th>
<th>Number of applied Protocols</th>
<th>Income (Million EGP)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemical industries</td>
<td>22</td>
<td>20.30</td>
</tr>
<tr>
<td>Health</td>
<td>1</td>
<td>0.50</td>
</tr>
<tr>
<td>Textile Industries</td>
<td>4</td>
<td>0.12</td>
</tr>
<tr>
<td>Pharmaceutical Industries</td>
<td>4</td>
<td>0.72</td>
</tr>
<tr>
<td>Environmental Field</td>
<td>7</td>
<td>8.44</td>
</tr>
<tr>
<td>Engineering Field</td>
<td>9</td>
<td>1.98</td>
</tr>
<tr>
<td>Food and nutrition industries</td>
<td>4</td>
<td>10.22</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>51</strong></td>
<td><strong>42.28</strong></td>
</tr>
</tbody>
</table>
Current R & D Projects in NRC

- International Projects
  - No: 51
  - Budget: 67 M LE

- In-House Projects
  - No: 302
  - Budget: 33 M LE

- National Projects
  - No: 217
  - Budget: 65 M LE

- National Challenge Projects
  - No: 3
  - Budget: 2 M LE

Projects have developmental nature (Sinai Projects)

- No: 26
- Budget: 5 M LE
Pilot Plant

A multipurpose Pilot Plant, a Chinese Grant
Some Plant Equipment

- Distillation
- 2 Reactors
- Multi-speed Centrifuge
- Extraction
- Filtration
- Dryer
- Absorption
Current Strategy (Cont.)

INTERNATIONAL RELATIONS
International Relations

International Relations Office:
Scientific channels with regional and international universities and research centers.
Projects, contracts and scientific agreements.

African Relations Office:
Promotes the Scientific cooperation with African countries

European Relations Office:
Promotes the Scientific cooperation with European countries
NRC Networking

International Organizations:

- **Center of excellence** (2004) by the Commission on Science and Technology for Sustainable Development in the South, **COMSATS & for Biotechnology** (2007)
- **The interim regional hub** in Biosciences for North Africa by the New Partnership for Africa’s Development, **NEPAD**
- Third World Academy of Science, **TWAS**
- Third World Network for Scientific Organizations, **TWINSO**
- World Association of Industrial and Technological Research Organizations, **WAITRO**
- Middle East and North Africa (**MENA**)
  - African Network for Drugs and Diagnostic (**ANDI**)
  - African Academy of Sciences (**ASF**)
Recently Signed International Protocols

The National Research Council in Italy

Korean Industrial Technology Foundation

National Engineering Academy of Kazakhstan

Yarmuke University in Jordan

Sudanese Centre for Res. & Indust. Consultations

Arab Union of Textile Industries

Technical University of Liberec, Czech Republic

National Cancer Institute, USA
Scientific Records
Number of published articles (scopus)
Number of Accepted Patents

- 2006: 6
- 2007: 8
- 2008: 15
- 2009: 13
- 2010: 9
- 2011: 14
- 2012: 16
- 2013: 8
- 2014: 9
- 2015: 23
In-House: 200
STDF: 120
ASRT: 19
France: 20
EU: 12
USA: 31
Germany: 24
Others: 12
Other local: 8
Spain: 9
Sweden: 6

No. of Research Projects
Apart from many other International and NRC prizes.
Why are we here?

COMSATS

Come  Suggest  Assign  Tty  Solve
Applied Research opportunities

The National Research Centre of Egypt has reputable contributions in many fields. The NRC is willing to promote collaboration with the staff of the akin disciplines in the COMSATS’ member states in the following fields
Applied Research opportunities

1- Health

- Triplet PCR kits for HCV, TB and toxoplasma
- Production of immunoassay kits for HCV antibodies and antigens
- Early detection of biochemical genetic diseases
- Stem cells
- Obesity
- Diabetes
- HCV
- Cancer
Applied Research opportunities

2- Solar Cells

- Preparation of solar cell layers
- Design of solar cell
- Manufacture of solar cells
- Application of solar cells
Hard disk applications based on magnetic nanoparticle

Biosensor based on metal and semiconductor nanoparticles for virus, bacteria and DNA detection

Bioactivity of ceramic/polymers nanocomposite for biomedical applications

Application of carbon nanotubes in medicine and environment
Applied Research opportunities

4- Renewable energy
Purification of industrial water from heavy metals and other contaminants

Functional Food from traditional experience to modern production

Functional polymers for various applications
Applied Research opportunities

6- Agriculture

- Abiotoc stress
- Biocontrol
- Oil-producing crops
Thank You