COMSATS’ International Thematic Research Group on Natural Products Sciences

Presented by
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17th MEETING OF COMSATS COORDINATING COUNCIL
Hosted by
Iranian Research Organization for Science & Technology (IROST), Tehran,
19-20 May 2014
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Natural products are secondary metabolites (e.g. alkaloids, coumarins, flavonoids, lignans, steroids and terpenoids) isolated from plants, animals or microorganisms.

The use of natural products, especially plants, as medicines is ancient and universal.

According to WHO, about 88 per cent of the world’s population rely mainly on traditional medicine for their primary health care.
Neglected tropical diseases, such as leishmaniasis, malaria, dengue are more prevalent in developing countries, affecting approximately 1 billion people in the world.

Developing countries are rich in medical plants which have been used by folk people for the treatment of various diseases.

Effective, safe, and affordable modern medicines are not available to poor population living the developing world.

For example, the cost of newer antimalarial drugs is unaffordable sometimes unavailable to local population where malaria is endemic.
In modern drug discovery and development processes, natural products play an important role at the early stage of ‘lead’ discovery, i.e. discovery of the active natural molecule, which itself or its structural analogues could be an ideal drug.

Over the last century, a number of top selling drugs have been developed from natural products.
Natural Product based Drug Discovery

- Atropine obtained from *Atropa belladonna*,
- Strychnine a CNS stimulant,
- Ziconotide identified from a cone snail, *Conus magus*, (non-NSAID analgesic drug)
- Taxol® obtained from the bark of the Pacific yew tree
Collaborative research on traditional plants and validation of potentially useful natural products for diseases should be carried out in order to achieve self reliance.

There is strong need of training of manpower in the key aspects of natural product research and its applications to make drug discovery programs stronger in developing countries.
Foundation of COMSATS’ International Thematic Research Group on Natural Products Sciences

Under the leadership of Director ICCBS, Prof. M. Iqbal Choudhary, H.I., S.I., T.I., COMSATS’ International Thematic Group on Natural Products Sciences was launched during the Foundation meeting at the ICCBS on 26th November, 2010 through a Memorandum of Understanding signed by several COMSATS countries.
COMSATS’ International Thematic Research Group on Natural Products Sciences

Objectives

- To promote research collaboration among the members.
- To plan joint research projects.
- To train students, technicians and senior professionals.
- To organize regular events, such as workshops, training courses.
- To share expertise and lab resources.
COMSATS' ITRG ON Natural Products Sciences

Members Present at the Foundation Meeting
ICCBS is the designated Lead Centre for this thematic research group.

During the foundation meeting, five collaborating institutions were selected as its members:

- National Research Centre (Egypt);
- Industrial Research and Consultancy Centre (Sudan);
- Tanzania Industrial Research and Development Organization (Tanzania);
- Royal Scientific Society (Jordan);
- Iranian Research Organization for Science & Technology (Iran).
Members of COMSATS’ ITRG on Natural Products Sciences

Nineteen participants from eight countries, Bangladesh, Egypt, Iran, Jordan, Nigeria, Pakistan, Sudan, Turkey, attended the meeting.

Other participating institutions of the meeting included:
- Department of Science Laboratory Technology of the Federal Polytechnic (Nigeria)
- Institute of Fundamental Studies (Sri Lanka)
- Department of Biochemistry and Molecular Biology, University of Dhaka
- Department of Biology, Ege University (Turkey)
- Lorestan University of Medical Sciences (Iran)
COMSATS' ITRG on Natural Products Sciences

COMSATS Member Countries

Main Activities
Capacity Building and Joint Research Project

Natural Products as Leads for Drug Discovery

TRAINING/WORK
Dr. Cenk Durmuşkahya, (Assistant Professor, Celal Bayar University) visited ICCBS, during 13-30 January 2014, as an academic visitor under COMSATS Thematic Group program.

He received training in natural product research
An international workshop entitled, “Plant Products Chemistry” and International Symposium on Medicinal-Aromatic Plants”, during 3-7 June 2013, was organized by COMSATS Thematic Group on Natural Products Sciences, Ege University, Izmir, Turkey, and International Center for Chemical and Biological Sciences, University of Karachi, Pakistan.

http://www.ppcw2013.com
COMSATS’ International Thematic Research Group on Natural Products Sciences

Topics

- Phytotherapy
- Pharmacognosy and Phytochemistry
- Medicinal-Aromatic Plants (MAP) and Food Industries
- Environment & MAP Systems, Sustainable Use
- Horticulture of Medicinal Plants Production and manufacturing systems
- Basic Research
- Good Practices of Traditional Healing
- Marketing Systems - Opportunities and Challenges
COMSATS’ International Thematic Research Group on Natural Products Sciences

Organisers

Prof. Dr. Fazilet Vardar Sukan
(Dept. of Bioengineering, Ege University, Izmir, Turkey)

Prof. Dr. Munir Ozturk
(Rtd. Prof. of Botany, Ege University, Izmir, Turkey)

Prof. Dr. M. Iqbal Choudhary (H. I., S. I., T. I.)
(Director ICCBS, University of Karachi, Pakistan)

Prof. Dr. Erdal Bedir
(Dept. of Bioengineering, Ege University, Izmir, Turkey)
The second meeting of ITRG was conducted under the leadership of Prof. M. Iqbal Choudhary.

Several new members from different countries were introduced during the meeting with the objective
Objectives

- to expand the group over several countries.
- to review previous group activities.
- to strategize the future plans for group activities.
Agenda

Strategy for Instrument Sharing Program for member institution

Strategy for Bioassay Screening Program for member institution

Screening of Plant Extracts in Antimicrobial and antiparastic Assays in order to discover new lead compounds against infections

Program for Training Visits (Scientists and Technicians)
Second Meeting of COMSATS ‘ITRG on Natural Products Sciences in Izmir, Turkey, June 06, 2013

Dr. Makhloufi Ahmed
University of Bechar, Algeria

Dr. Nazli Boke Sarikohya
Ege University, Faculty of Science, Chemistry Department, Bornovo, Izmir, Turkey

Dr. Nurgul Sultanova
Al-Farabi Kazakh National University Chemistry and Chemical Technology Faculty, Al-Farabi 71, Almaty Kazakhstan
Second Meeting of COMSATS ‘ ITRG on Natural Products Sciences in Izmir, Turkey, June 06, 2013

Dr. Shynar Zhumogolyieca
Alfarabi Kazakh National University
Chemistry and Chemical Technology
Faculty Alfarabi 71, Almaty
Kazakhstan

Dr. Moses Zaruwa
Adamana State University
P.M. B 25, Molzi, Adamawa State
Nigeria

Dr. Amir Reza Jassibi
Medicinal and Natural Products Chemistry Research Center,
Sheraz University of Medical Sciences,
shiraz
Iran
Second Meeting of COMSATS ‘ITRG on Natural Products Sciences in Izmir, Turkey, June 06, 2013

Dr. Cenk Durmuskahya,
Celal Bayar University Biology Department, Manisa
Turkey

Dr. Waleed S. Koko
Medicinal and Aromatic Plants Research Institute, National Center for Research, Khartoum, Sudan

Dr. Jamal Mesogi
Department of Pharmacognosy and Medicinal Plant, Faculty of Pharmacy
University of Tripoli
Libya

Dr. Boulonouar Ali
University of Buchar
Algeria
Second Meeting of COMSATS ‘ ITRG on Natural Products Sciences in Izmir, Turkey, June 06, 2013

Dr. Benlarbi Lorbi
University of Bechar
Department of Science and Technology
Algeria

Dr. Basile-Jimmy Djimtomvaye
Ege University
Department of Chemistry
Turkey

Prof. Dr. Mahmoud I. Mostafa Nassar,
Pharmaceutical Industries Division,
National Research Centre (NRC),
Egypt
Prof. Dr. Latifa K. Darusman
Biopharmaca Research Center, Bogan
Agricultural University
Indonesia
Second Meeting of COMSATS ‘ITRG on Natural Products Sciences in Izmir, Turkey, June 06, 2013

Dr. Mehmood Reza Moen
Associate Professor of Pharmacognosy, School of Pharmacy Sheraz University of Medical Sciences Shiraz, Iran

Prof. Dr. Suheyla Kirmizigul, Ege University, Faculty of Science Turkey.
Dr. Asma Bettaiev
National Agronomic Institute of Tunisia
Tunisia

Dr. Moufiola Oveslati
University of Science Mathematics and Physics of Tunis
Tunisia
IROST, ICCBS and COMSATS, jointly organized an “International Seminar/Workshop cum Exhibition on Sustainable Utilization of Natural Products for Human Health and Well Being”

attended by several students and researchers from various institutions and industries of Tehran.

Four resource persons from Pakistan and Malaysia were invited.
International Seminar / Workshop
January 20-23, 2014 in IROST Complex, Tehran, Iran

Topics
Ethnobotany, natural product chemistry, pharmacology, bioassay techniques used in drug discovery, latest approaches of drug discovery based on natural products for the human health and well being.
MoU was signed in a signature ceremony, between IROST and International Center for Chemical and Biological Sciences (International Center for Chemical and Biological Sciences), University of Karachi, Karachi, Pakistan.”
Activities of COMSATS' ITRG on Natural Products Sciences

JOINT RESEARCH PROJECT
JOINT RESEARCH PROJECT

Drug Discovery from Nature for Neglected Diseases

Initiated by
COMSATS THEMATIC GROUP
ON NATURAL PRODUCTS SCIENCES

GROUP LEADER
Prof. Dr. M. Iqbal Choudhary  H. I., S. I., T. I.
Director, ICCBS

Group members from Turkey, Sudan, Egypt, Nigeria, SriLanka, Malaysia, Indonesia and Pakistan have participated in joint research proposal entitled, “Drug Discovery from Nature for Neglected Diseases”.

- Selection of folk plants used in parasitic diseases prevalent in developing countries
- Preparation of crude plant and preliminary phytochemical and biological activity evaluation at member institution
- Identification of active principles of plants at the ICCBS under supervision of Group Leader
- Joint investigation on active extract at ICCBS in collaboration with member country after signing an MOU
- Preliminary analysis and screening of medicinal plant extracts at the ICCBS
- Training Workshop at ICCBS
- Joint publications and patent filling on important discoveries
- NEW DISCOVERIES FROM PLANTS
Members actively participating in the group.

Dr. Mahmoud I. Mostafa Nassar  
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Members actively participating in the group.

Prof. Munir Ozturk
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Prof. Dr. M. Iqbal Choudhary H.I., S.I., T.I.
Director, International Center for Chemical and Biological Sciences University of Karachi, Karachi, Pakistan

Dr. Farzana Shaheen
International Center for Chemical and Biological Sciences University of Karachi, Karachi, Pakistan

Dr. Atia-tul-Wahab
International Center for Chemical and Biological Sciences University of Karachi, Karachi, Pakistan
JOINT RESEARCH PROJECT

Selection of folk plants used in parasitic diseases prevalent in developing countries

Identification of active principles of plants at the ICCBS under supervision of Group Leader

Joint investigation on active extract at ICCBS in collaboration with member country after signing an MOU

Preparation of crude plant and preliminary phytochemical and biological activity evaluation at member institution

Preliminary analysis and screening of medicinal plant extracts at the ICCBS Training Workshop at ICCBS

Joint publications and patent filling on important discoveries

NEW DISCOVERIES
Collaborative Work of Members from Sudan With ICCBS

Dr. Waleed Koko research group from Medicinal and Aromatic Plants Research Institute (MAPR), Sudan, has prepared 32 medicinal plant extracts and submitted to the ICCBS for Biological screenings which is under process.
Bioassay-guided isolation work on Plants endemic to Turkey.

- Centaurea lydia (Astreaceae family),
- Centaurea calolepis (Asteraceae family),
- Circium sipyleum (Astreaceae family),
- Achillea millefolium subsp. sipylea (Astreaceae family),
- Sideritis sipylea (Lamiaceae family)
- Eryngium thorifolium (Apiaceae family).
**Phytochemical work and Biological Screening of Eryngium thorifolium**

**Species:** *Eryngium thorifolium*

**Family:** Apiaceae

**Part of plant:** Aerial part

**Powdered plant material (500 gm)**

Extracted with 80% Methanol, Water

**Crude Extract**

Suspended in dist. Water and shaken with n-hexane

**n-Hexanes extract (3.38 g)**

Inactive against activity #1, 2, 3, 4, 5

Significant Activity show against activity #6

Shaken with n-hexane

**Aqueous Phase**

Shaken with DCM

**Dichloromethane extract (3.4 g)**

Inactive against activity #1, 2, 3, 4, 5

Moderate Activity show against activity #6

**Aqueous phase**

Shaken with Ethyl acetate

**Ethylacetate extract (3.4 g)**

Inactive against all activity

**Aqueous extract (1.5 g)**

Activity Performed:

1. Brine Shrimp (*Artemia salina*) Lethality Bioassay
2. In Vitro Antibacterial Bioassay
3. In Vitro Antifungal Bioassay
4. Insecticidal Activity by Contact Toxicity Method
5. Invitro Phytotoxic Bioassay
6. Antiflasmental Activity Bioassay
Phytochemical work and Biological Screening of *Centaurea calolepis*

Species: *Centaurea calolepis*
Family: Asteraceae
Part of plant: Aerial part

- **Powdered plant material (500 gm)**
  - Extracted with 80% Methanol, Water

- **Crude Extract**
  - Suspended in dist, Water and shaked with n-hexanes
  - Shaked with n-hexane

- **n-Hexane phase (7.2 g)**
- **Aqueous Phase**
  - Shaked with DCM

- **Dichloromethane extract (11.4 g)**
- **Aqueous phase**
  - Shaked with Ethyl acetate

- **Ethylacetate phase (34.0 g)**
- **Aqueous phase (15.1 g)**

**Activity Performed**
1. Brine Shrimp (Artemia salina) Lethality Bioassay
2. In Vitro Antibacterial Bioassay
3. In Vitro Antifungal Bioassay
4. Insecticidal Activity by Contact Toxicity Method
5. Invitro Phytoxic Bioassay
6. Antilashmenial Activity Bioassay
**Species:** *Circium sipyleum*  
**Family:** Asteraceae  
**Part of plant:** Aerial part

1. **Powdered plant material (1500 g)**  
2. **Extracted with 80% Methanol, Water**  
   - **Crude Extract**
   - **Suspeled in dist, Water and shaked with n-hexane**
3. **n-Hexane phase (7.9 g)**  
4. **Shaked with n-hexane**
5. **Dichloromethane extract (9.2g)**  
6. **Aqueous phase**
   - **shaked with DCM**
7. **Aqueous phase**
   - **shaked with Ethyl acetate**
8. **Ethylacetate extract (11.5 g)**  
9. **Aqueous extract (53g)**

**Activity Performed**
1. Brine Shrimp (*Artemia salina*) Lethality Bioassay  
2. In Vitro Antibacterial Bioassay  
3. In Vitro Antifungal Bioassay  
4. Insecticidal Activity by Contact Toxicity Method  
5. Invitro Phytoxic Bioassay  
6. Antilashmenial Activity Bioassay
**Species:** *Achillea millefolium*  
**Family:** Asteraceae  
**Part of plant:** Aerial part  

- **Powdered plant material (1800 g)**  
  - Extracted with 80% Methanol / Water

**Crude Extract**
- Suspected in dist, Water and shaked with n-hexane
- Shaked with n-hexanes

- **n-Hexane phase (12.1 g)**
- **Aqueous Phase**
  - Shaked with DCM
  - **Dichloromethane extract (17.3 g)**
  - **Aqueous phase**
    - Shaked with Ethyl acetate
    - **Ethylacetate phase (53.3 g)**
    - **Aqueous extract 48.3 g**

**Activity Performed**
1. Brine Shrimp (Artemia salina) Lethality Bioassay
2. In Vitro Antibacterial Bioassay
3. In Vitro Antifungal Bioassay
4. Insecticidal Activity by Contact Toxicity Method
5. In Vitro Phytoxic Bioassay
6. Antilashmenial Activity Bioassay
**Phytochemical work and Biological Screening of Sideritis spyleum**

- **Species**: *Sideritis spyleum*
- **Family**: Lamiaceae
- **Part of plant**: Aerial part

1. **Powdered plant material (600 g)**
   - Extracted with 80% Methanol / Water

   **Crude Methanolic Extract**

   - Suspended in dist. Water and shaken with *n*-hexanes

   **n-Hexanes extract (2.7 g)**
   - Inactive against all activities
   - Shaken with *n*-hexanes

   **Aqueous Phase**

   - Shaken with DCM

   **Dichloromethane extract (22.7 g)**
   - Inactive against activities #1, 2, 3, 4, 6
   - Significant activity at high dose against activity #5

   **Aqueous phase**

   **Ethyl acetate extract (15.8 g)**
   - Inactive against all activities

   **Aqueous extract (20.1 g)**

2. **Activity Performed**
   - 1. Brine Shrimp (*Artemia salina*) Lethality Bioassay
   - 2. In Vitro Antibacterial Bioassay
   - 3. In Vitro Antifungal Bioassay
   - 4. Insecticidal Activity by Contact Toxicity Method
   - 5. Invitro Phytoxic Bioassay
   - 6. Antilashmential Activity Bioassay
One of the most active Group member Prof. Dr. Munir (Turkey) submitted Plants submitted five plant extracts for 20 bioassays screenings

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Plant</th>
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</thead>
<tbody>
<tr>
<td>1.</td>
<td><em>Plantago major</em></td>
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<tr>
<td>2.</td>
<td><em>Garcenia atroviridis</em></td>
</tr>
<tr>
<td>3.</td>
<td><em>Rhizophora mucronata</em></td>
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<tr>
<td>4.</td>
<td><em>Xylocarpus granatum</em></td>
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<tr>
<td>5.</td>
<td><em>Leptospermum flavescens</em></td>
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</tbody>
</table>
JOINT RESEARCH PROJECT
Collaborative Work of Members from Turkey
Plants selected for future bioassay-guided isolation studies

*Leptospermum flavescens* Sm. And *Rhizophora mucronata*

On the basis of significant Immunomodulatory activity, antileishmanial and anticancer activities
Bioassay-guided isolation work on biologically crude extracts of selected plants.

- *Centaurea lydia* (Asteraceae family),
- *Centaurea calolepis* (Asteraceae family),
- *Circium sipyleum* (Asteraceae family),
- *Achillea millefolium* subsp. *sipylea* (Asteraceae family),
- *Sideritis sipylea* (Lamiaceae family)
- *Eryngium thorifolium* (Apiaceae family).
Workshop on Natural Products Chemistry
& International Symposium on Medicinal-Aromatic Plants
Venu: Near East University, Dates: 29-30 September 2014

The proposed workshop and symposium will be jointly organized by Near East University in the Turkish Republic of Northern Cyprus, ICCBS, Pakistan, and COMSATS Thematic Group on Natural Products Sciences.

Organizers
Assoc. Prof. Dr. Salih Gücel (TRNC)
Prof. Dr. M. Iqbal Choudhary (Director General ICCBS-Karachi University, Pakistan)
Prof. Dr. Münir Öztürk (Advisor)

Scientific Secretariat
Dr. Farzana Shaheen
Dr. Atia-tul-Wahab
Fatma Kaya Yıldırım

Congress Secretariat
Environmental Research Center
Submission of PC-1 for Funding

ICCBS / COMSATS are jointly working to submit PC-1 to Government of Pakistan for financial assistance to joint research project.
Thank you very much for your attention

ITRG Email

Comsats.thematic.group@gmail.com