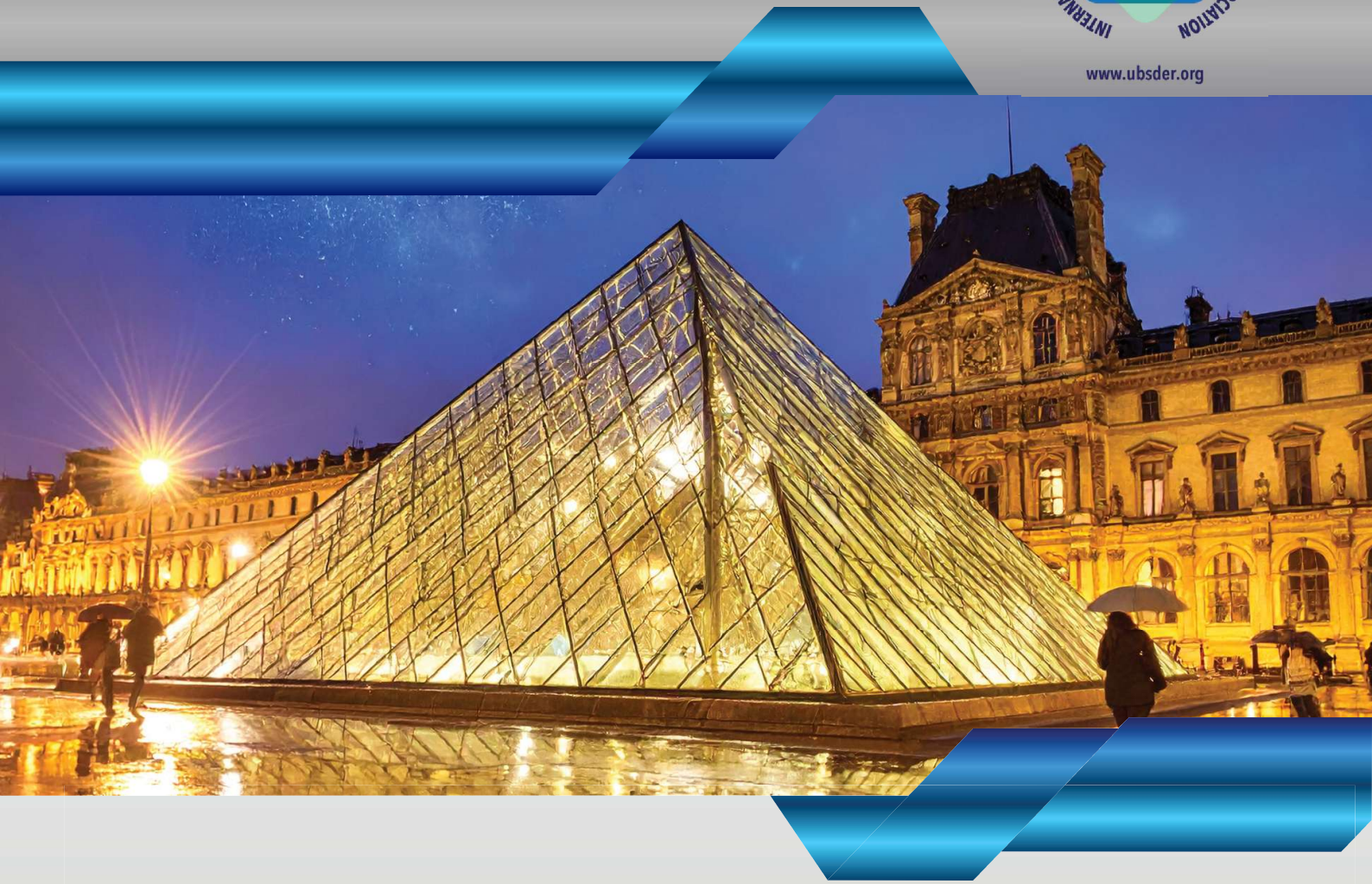


# PROCEEDING BOOK

## 5TH INTERNATIONAL PARIS APPLIED SCIENCE CONGRESS

**DECEMBER 20-22, 2025 PARIS**

**EDITOR**
**Prof. Dr. Hakkı ÇİFTÇİ**

**ISBN: 978-625-6997-90-5**

# 5th INTERNATIONAL PARIS APPLIED SCIENCE CONGRESS

*December 20-22, 2025 PARIS*

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# PROCEEDINGS BOOK

EDITOR IN CHIEF

*Prof. Dr. Hakkı ÇİFTÇİ*

**ISBN: 978-625-6997-90-5**

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# CONGRESS ID

## CONGRESS TITLE

*5th INTERNATIONAL PARIS APPLIED SCIENCE CONGRESS*

## DATE and PLACE

*December 20-22, 2025 PARIS*

## ORGANIZATION

**UBS-Institute of International Scientific Research and Strategy Development Association, Akademik Paylaşım Platformu Eğitim Ltd.Şti.,Ankara,Türkiye**

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## EDITOR IN CHIEF

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**International Journal of Health and Applied Science (IJHAS), Türkiye**

## PARTICIPANT COUNTRIES (9):

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## NUMBER OF ACCEPTED PAPERS (164):

(Türkiye-73, Other Countries-91)

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Oral presentation

## EVALUATION PROCESS

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Konu: Kongre Düzenleme Kurulu 05.10.2024

Sayı:2024/003

İLGİLİ KURUMA

İçişleri Bakanlığı tarafından tahsis edilen 06-139-180 tescil kodu ile Tüzel kişiliğe sahip olan Uluslararası Bilimsel Araştırma ve Strateji Geliştirme Derneği, 5253 sayılı kanuna uygun olarak "Bilimsel Araştırmalar ve Akademik Çalışmalar" alanında ulusal ve uluslararası düzeyde faaliyetlerini yürütmektedir.

Kurumumuzun Yönetim Kurulu tarafından, 05.10.2024 tarihinde saat 14:00'da "Bilimsel Çalışmalarda Strateji Geliştirme" görüşmeleri ile "Bilimsel Kongreler Düzenlenmesi" gündemleri ile toplanmış ve alınan 9 nolu karara istinaden aşağıda detayları yazılı olan bilimsel etkinliğin düzenlenmesine ve etkinliğe ilişkin akademisyenlerin resmi olarak görevlendirilmesine oy birliği ile karar verilmiştir.

Bilgi ve gereğini arz ederim.

Dr. Nadire KANTARCIOĞLU

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Etkinlik Tarihi: 20-22 Aralık 2025 PARİS

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Uluslararası Bilimsel Araştırma ve Strateji Geliştirme Derneği

5th INTERNATIONAL PARIS APPLIED SCIENCE CONGRESS
December 20-22, 2025 PARIS

**Sayı:**2025/015

**İlgili Makama:**

Uluslararası Bilimsel Araştırma ve Strateji Geliştirme Derneği (UBSDER) tarafından organize edilen "**5th INTERNATIONAL PARIS APPLIED SCIENCE CONGRESS**" Aralık 20-22, 2025 tarihinde 7 farklı ülkeden (Türkiye'den 73, yurt dışından 91 bildiri sunuldu) olmak üzere toplam 164 adet sunum yapılarak, çevrimiçi olarak düzenlenmiştir. Kongremiz, 16 Ocak 2020'de Akademik Teşvik Ödeneği Yönetmeliğine getirilen "Tebliğlerin sunulduğu yurt içinde veya yurt dışındaki etkinliğin uluslararası olarak nitelendirilebilmesi için Türkiye dışından en az beş farklı ülkeden sözlü tebliğ sunan konuşmacının katılım sağlaması ve tebliğlerin yarıdan fazlasının Türkiye dışından katılımcılar tarafından sunulması esastır." Değişikliğine uygun olarak düzenlenmiştir.

Bilgilerinize Arz Ederim

25.12.2025

Dr. Nadire KANTARCIOĞLU

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# 5th INTERNATIONAL PARIS APPLIED SCIENCE CONGRESS

*December 20-22, 2025 PARIS*

## CONGRESS PROGRAM

**Meeting Link:**
https://us06web.zoom.us/j/4603636838?pwd=Gx9rIRf5cUTPsZZ4pilDYkYWaaEAc6.1&omn=88446017548

**Meeting ID:** 460 363 6838
**Password:** 121314

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**PARTICIPANT COUNTRIES (9):**
**France, Iraq, India, Thaliand, Philippines, Nigeria, Pakistan, USA, Türkiye**

**Türkiye: 73** **Other Countries: 91**

## ÖNEMLİ, DİKKATLE OKUYUNUZ LÜTFEN / IMPORTANT, PLEASE READ CAREFULLY

### Önemli, Dikkatle Okuyunuz Lütfen

- ✓ Kongremizde Yazım Kurallarına uygun gönderilmiş ve bilim kurulundan geçen bildiriler için online (video konferans sistemi üzerinden) sunum imkanı sağlanmıştır.
- ✓ Online sunum yapabilmek için **https://zoom.us/join** sitesi üzerinden giriş yaparak "Meeting ID or Personal Link Name" yerine ID numarasını girerek oturuma katılabilirsiniz.
- ✓ Zoom uygulaması ücretsizdir ve hesap oluşturmaya gerek yoktur.
- ✓ Zoom uygulaması kaydolmadan kullanılabilir.
- ✓ Uygulama tablet, telefon ve PC'lerde çalışıyor.
- ✓ Her oturumdaki sunucular, sunum saatinden 15 dk öncesinde oturuma bağlanmış olmaları gerekmektedir.
- ✓ Tüm kongre katılımcıları canlı bağlanarak tüm oturumları dinleyebilir.
- ✓ Moderatör – oturumdaki sunum ve bilimsel tartışma (soru-cevap) kısmından sorumludur.

### Dikkat Edilmesi Gerekenler- TEKNİK BİLGİLER

- ✓ Bilgisayarınızda mikrofon olduğuna ve çalıştığına emin olun.
- ✓ Zoom'da ekran paylaşma özelliğine kullanabilmelisiniz.
- ✓ Kabul edilen bildiri sahiplerinin mail adreslerine Zoom uygulamasında oluşturduğumuz oturuma ait ID numarası gönderilecektir.
- ✓ **Katılım belgeleri kongre sonunda tarafınıza pdf olarak gönderilecektir**
- ✓ Kongre programında yer ve saat değişikliği gibi talepler dikkate alınmayacaktır

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- ✓ The Zoom application is free and no need to create an account.
- ✓ The Zoom application can be used without registration.
- ✓ The application works on tablets, phones and PCs.
- ✓ The participant must be connected to the session 15 minutes before the presentation time.
- ✓ All congress participants can connect live and listen to all sessions.
- ✓ Moderator is responsible for the presentation and scientific discussion (question-answer) section of the session.

### Points to Take into Consideration - TECHNICAL INFORMATION

- ✓ Make sure your computer has a microphone and is working.
- ✓ You should be able to use screen sharing feature in Zoom.
- ✓ **Attendance certificates will be sent to you as pdf at the end of the congress.**
- ✓ Requests such as change of place and time will not be taken into consideration in the congress program.

**Before you login to Zoom please indicate your name_surname and HALL number,**

**exp. Hall-1, Hakan ÖZTÜRK**




Meeting ID: **460 363 6838**

Passcode: **121314**

*5th INTERNATIONAL PARIS SOCIAL & APPLIED SCIENCE CONGRESS*
*December 20-25, 2025 PARIS*

## FACE TO FACE

| 20.12.2025 | |
|---|---|
| PARIS | PARIS TIME: 11:00 AM |

**CHAIR:** Prof. Dr. Sedat CERECİ
**CHAIR VICE:** Res. Asst. Deniz COŞKUN

| Author(s) | Affiliation | Title |
|---|---|---|
| Res. Asst. Deniz COŞKUN,<br>Prof. Dr. Muzaffer SELÇUK, | Van Yüzüncü Yıl Üniversitesi Spor Bilimleri Fakültesi, Spor Yöneticiliği Bölümü<br>&<br>Van Yüzüncü Yıl Üniversitesi Spor Bilimleri Fakültesi, Beden Eğitimi ve Spor Anabilim Dalı, | COMPARISON OF ARTIFICIAL INTELLIGENCE ANXIETY LEVELS BY OCCUPATIONAL GROUPS |
| Res. Asst. Deniz COŞKUN<br>Assoc. Prof. Dr. Mücahit SARİKAYA<br>Prof.Dr. Zeynep Filiz DİNÇ, | Van Yüzüncü Yıl Üniversitesi Spor Bilimleri Fakültesi, Spor Yöneticiliği Bölümü<br>&<br>Van Yüzüncü Yıl Üniversitesi Spor Bilimleri Fakültesi, Spor Yöneticiliği<br>&<br>Çukurova Üniversitesi Spor Bilimleri Fakültesi, Beden Eğitimi ve Spor Anabilim | THE POWER OF RHYTHM: THE EFFECTS OF ZUMBA EXERCISES ON STRESS, ANXIETY, AND SELF-ESTEEM |
| Furkan KIZILTAŞ<br>Assoc. Prof. Dr. Salih ÖNER<br>Prof. Dr. Hamit Hakan ALP<br>Res. Asst. Dr. Beyza ERTAN | Van Yüzüncü Yıl Üniversitesi, Spor Bilimleri Fakültesi BES Anabilimdalı<br>&<br>Van Yüzüncü Yıl Üniversitesi, Spor Bilimleri Fakültesi<br>&<br>Van Yüzüncü Yıl Üniversitesi, Tıp Fakültesi, Temel Tıp Bilimleri Bölümü<br>&<br>Van Yüzüncü Yıl Üniversitesi, Spor Bilimleri Fakültesi | EFFECTS OF DIFFERENT TYPES OF EXERCISE ON S-KLOTHO PROTEIN, PRO- INFLAMMATORY CYTOKINES, AND OXIDATIVE DNA DAMAGE IN ATHLETES |
| Göksu DEMİR<br>Assoc. Prof. Dr. Leyla Firuze ARDA<br>Assoc. Prof. Dr. Emrah KOPARAN | Amasya Üniversitesi, SBE İktisat Anabilim Dalı<br>&<br>Amasya Üniversitesi, İ.İ.B.F. İktisat<br>&<br>Amasya Üniversitesi, İ.İ.B.F. Havacılık Yönetimi | STRUCTURAL ANALYSIS OF THE LABOR MARKET: THE MERZIFON EXAMPLE |
| Prof. Dr. Sedat Cereci | Hatay Mustafa Kemal University, Faculty of Communication | TECHNOLOGY AND HUMAN RELATIONSHIP |
| Res. Asst. Tevfik Can BABACAN | Nişantaşı Üniversitesi, İngiliz Dili ve Edebiyatı Bölümü | "WHEAT FIELDS" in ART: FROM EARLY DEPICTIONS TO CONTEMPORARY INTERPRETATIONS |
| İsmail Derrida Kıran | Van Yüzüncü Yıl Üniversitesi Sosyoloji Bölümü | ISLAM, IMMIGRATION, AND IDENTITY IN EUROPE |

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# Opening Ceremony

Online

*Date:* **December 20, 2025**

*Time:* *19:00*

**Meeting Link:**
https://us06web.zoom.us/j/4603636838?pwd=Gx9rIRf5cUTPsZZ4pilDYkYWaaEAc6.1&omn=88446017548

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## Speeches:

***Prof. Dr. Hakkı ÇİFTÇİ***
***Cukurova University, Türkiye***

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- *The Zoom application can be used without registration.*
- *The application works on tablets, phones and PCs.*
- *Speakers must be connected to the session 10 minutes before the presentation time.*
- *Online presentations; Presentation time is 10 minutes. There is 5 minutes of question and answer time.*
- *All congress participants can connect live and listen to all sessions.*
- *During the session, your camera should be turned on at least %70 of session period*
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## *TECHNICAL INFORMATION*

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- *You should be able to use screen sharing feature in Zoom.*
- *Attendance certificates will be sent to you as pdf at the end of the congress.*
- *Moderator is responsible for the presentation and scientific discussion (question-answer) section of the session.*

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| 20.12.2025 | HALL-1/SESSION-1 |
|---|---|
| PARIS | TÜRKİYE TIME: 19:35-22:00 |

**CHAIR:** Asst. Prof. Dr. Ulvican YAZAR
**CHAIR VICE:** Lecturer. PhD. Taşkın TEZ

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|---|---|---|
| Asst. Prof. Dr. Ulvican YAZAR | Istanbul Gelisim University, Faculty of Applied Sciences | A FOUR-DIMENSIONAL APPROACH TO TRANSLATOR STATUS: THE TRANSLATOR FIGURE IN SABAHATTIN ALI'S SHORT STORY "DEKOLMAN |
| Asst. Prof. Dr. Ulvican YAZAR | Istanbul Gelisim University, Faculty of Applied Sciences | RAIF EFENDI AS A TRANSLATOR FIGURE IN FICTION: AN ANALYSIS WITHIN THE FRAMEWORK OF SIMMEL, BOURDIEU, AND GOFFMAN'S THEORIES |
| Arş. Gör. Dr. Sezen TAYAM<br>Assoc. Prof. Dr. Sibel ERDOĞAN<br>Asst. Prof. Dr. Mehmet Reşit KARAGEÇİLİ | Muş Alparslan Üniversitesi, Uygulamalı Bilimler Fakültesi<br>Van Yüzüncüyıl Üniversitesi, Ziraat Fakültesi | SMART TECHNOLOGIES FOR SUSTAINABILITY ANIMAL NUTRITION |
| Lecturer. PhD. Taşkın TEZ | Edirne Vocational College of Technical Sciences, Trakya University, 22030, Edirne, Turkey | IMPACT OF DIFFUSE IRRADIATION MODEL SELECTION ON ANNUAL ENERGY YIELD AND PERFORMANCE INDICATORS OF GRID-CONNECTED SELF-CONSUMPTION RESIDENTIAL PV SYSTEMS: A PV*SOL-BASED COMPARATIVE STUDY |
| Lecturer. PhD. Taşkın TEZ | Edirne Vocational College of Technical Sciences, Trakya University, 22030, Edirne, Turkey | CLASSIFICATION OF SOLAR ENERGY PRODUCTION LEVELS USING LOGISTIC REGRESSION: A METEOROLOGY-BASED APPROACH |
| Assoc. Prof. Dr. Ahmet TUMBUL<br>Hatice Yegane ACAR YORGUN | Harran University, Faculty of Education<br>&<br>Harran University, Department of Renewable Energy Sources | STRUCTURAL, MORPHOLOGICAL, AND OPTICAL PROPERTIES OF ZNO THIN FILMS: EFFECT OF NA INCORPORATION |
| Hilay ARSLAN<br>Asst. Prof. Dr. Melikşah TURAN | Erzurum Technical University, Faculty of Health Sciences | SUSTAINABLE ENERGY SOURCE PROPOSAL FOR ASSEMBLY AREAS |
| Asst. Prof. Dr. Mashar Cenk GENÇAL | Osmaniye Korkut Ata Üniversitesi, İktisadi ve İdari Bilimler Fakültesi, Yönetim Bilişim Sistemleri Bölümü | COMPARING THE PERFORMANCE OF THE ROOSTERS ALGORITHM AND THE STANDARD GENETIC ALGORITHM IN PHOTOVOLTAIC PARAMETER ESTIMATION |

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# 5th INTERNATIONAL PARIS APPLIED SCIENCE CONGRESS

*December 20-25, 2025 PARIS*

**ONLINE**

| 20.12.2025 | HALL-2/SESSION-1 |
|---|---|
| PARIS | TÜRKİYE TIME: 19:35-22:00 |

**CHAIR:** Assoc. Prof. Dr. Semra GÜRBÜZ

**CHAIR VICE:** Asst. Dr. İlker YÜCE

| Author(s) | Affiliation | Title |
|---|---|---|
| Assoc. Prof. Dr. Sadettin ÇELİK | University of Bingol, Genç vocational school, Department of Forestry, Türkiye | GLOBAL CLIMATE CHANGE AND ITS EFFECTS ON HONEYBEES |
| Mehmet VURAL<br>Muhammad Abu Bakar ZIA<br>Sani Mohammad TAJO<br>Abia YOUNAS<br>Roohi ASLAM<br>Rao Sohail Ahmad KHAN<br>Ibrahim Omer ELIMAM<br>Sadettin ÇELİK | Department of Information Technologies, Rectorate, Fırat University<br>Land Information and Management System, Green Pakistan Initiative, Pakistan<br>National Biotechnology Research and Development Agency, Bioresourece Unit Kano, Abuja Nigeria<br>Cotton research station, ayub Agricultural Research Institute, Faisalabad Pakistan<br>National university of sciences and technology, Islamabad/Pakistan<br>Centre of Agricultural Biochemistry and Biotechnology, University of Agriculture, Faisalabad, Pakistan.<br>Faculty of animal production, university of East kordofan – Sudan<br>Department of Forestry, Genç Vocational School, Bingol University, Genç-Bingol, | AUTONOMOUS COUNTERMEASURE SYSTEM FOR ORIENTAL HORNET (Vespa orientalis) USING MACHINE VISION-GUIDED HIGH-ENERGY LASER ABLATION |
| Assoc. Prof. Dr. Ekrem BÖLÜKBAŞI | Amasya Üniversitesi, Suluova Meslek Yüksekokulu, Çevre Koruma Teknolojileri Bölümü | ANALYSIS OF FAD2 GENE EXPRESSION RESPONSES TO HEAVY METAL STRESS IN SAFFLOWER (Carthamus tinctorius L.) VARIETIES |
| Assoc. Prof. Dr. Ekrem BÖLÜKBAŞI<br>Asst. Prof. Dr. Mehmet EKİCİ | Amasya Üniversitesi, Suluova Meslek Yüksekokulu, Çevre Koruma Teknolojileri Bölümü<br>Amasya Üniversitesi, Mühendislik Fakültesi, Elektrik Elektronik Mühendisliği Bölümü | SYSTEMATIC RESOLUTION OF CHALLENGES ENCOUNTERED IN GENE EXPRESSION ANALYSES USING THE TRIZ METHODOLOGY |
| Ercan KESKİNSOY<br>Res. Asst. Dr. İlker YÜCE<br>Prof. Dr. Hüseyin GÜNGÖR | Düzce Üniversitesi, Lisansüstü Eğitim Enstitüsü<br>Sivas Bilim ve Teknoloji Üniversitesi, Tarım Bilimleri ve Teknoloji Fakültesi<br>Düzce Üniversitesi, Ziraat Fakültesi | EVALUATION OF SOME DENT CORN VARIETIES IN TERMS OF GRAIN YIELD AND AGRONOMIC TRAITS UNDER THE ZONGULDAK ECOLOGICAL CONDITIONS |
| Assoc. Prof. Dr. Semra GÜRBÜZ | Mardin Artuklu University, Faculty of Tourism | USE OF MULTIVARIATE DATA ANALYSIS METHODS FOR THE DETERMINATION OF THE BOTANICAL AND GEOGRAPHICAL ORIGINS OF HONEY |
| Res. Asst. Halil UÇAR<br>Assoc. Prof. Dr. Murat OZAN | İnönü Üniversitesi, Spor Bilimleri Fakültesi, Beden Eğitimi ve Spor Öğretmenliği Bölümü, Battalgazi, Malatya.<br>Atatürk Üniversitesi, Spor Bilimleri Fakültesi, Antrenörlük Eğitimi Bölümü, Yakutiye, Erzurum. | EFFECTS OF SODIUM BICARBONATE ON AEROBIC ENDURANCE: AN ACUTE INTERVENTION STUDY IN BOXERS |
| Res. Asst. Halil UÇAR<br>Assoc. Prof. Dr. Yusuf BUZDAĞLI<br>Assoc. Prof. Dr. Umut YILMAZ | İnönü Üniversitesi, Spor Bilimleri Fakültesi, Beden Eğitimi ve Spor Öğretmenliği Bölümü, Battalgazi, Malatya.<br>Erzurum Teknik Üniversitesi, Spor Bilimleri Fakültesi, Antrenörlük Bölümü, Yakutiye, Erzurum.<br>Hakkari Üniversitesi, Spor Bilimleri Fakültesi, Antrenörlük Eğitimi Bölümü, Merkez, Hakkari. | NUTRITIONAL DIFFERENCES BETWEEN ELITE AND AMATEUR ATHLETES |

# 5th INTERNATIONAL PARIS APPLIED SCIENCE CONGRESS

*December 20-25, 2025 PARIS*

**ONLINE**

| 20.12.2025 | HALL-3/SESSION-1 |
|---|---|
| PARIS | TÜRKİYE TIME: 19:35-22:00 |

**CHAIR:** Prof. Dr. Mehmet Akif ERDEN

**CHAIR VICE:** Asst. Prof. Dr. Oğuz Kürşat DEMİRCİ

| Author(s) | Affiliation | Title |
|---|---|---|
| Tesfay Gebrehiwet HADUSH<br>Abdullah Selim PARLAKYİĞİT | Bursa Technical University, Department of Mechanical Engineering, 16310 Bursa, Türkiye | HEAT TRANSFER ANALYSIS OF AN INTERNAL COMBUSTION ENGINE PISTON VIA OPENFOAM |
| Prof. Dr. Mehmet ÇELİK<br>Ezgi Nur ÇOMAK<br>Emin Arda DEMİRCİ | Karabük Üniversitesi, Mühendislik ve Doğa Bilimleri Fakültesi | EXPERIMENTAL ANALYSIS OF LOAD-DEPENDENT ENGINE BEHAVIOR WITH DIESEL BLENDS CONTAINING MULTI-WALLED CARBON NANOTUBES |
| Prof. Dr. Mehmet Akif ERDEN | Karabük Üniversitesi, Mühendislik ve Doğa Bilimleri Fakültesi, Biyomedikal Mühendisliği Bölümü, Merkez, Karabük | EFFECT OF ADDING TI-NB TO TENSILE STRENGTH OF NB-TI MICROALLOY STEEL PRODUCED BY POWDER METALLURGY |
| Prof. Dr. Mehmet Akif ERDEN | Karabük Üniversitesi, Mühendislik ve Doğa Bilimleri Fakültesi, Biyomedikal Mühendisliği Bölümü, Merkez, Karabük | THE EFFECT OF HEAT TREATMENT ON NB-TI MICROALLOY STEEL PRODUCED BY POWDER METALLURGY |
| Mehmet TARAK<br>Prof. Dr. Mehmet ÇELİK | Karabük Üniversitesi, Lisansüstü Eğitim Enstitüsü, Makine Mühendisliği Bölümü<br>&<br>Karabük Üniversitesi, Mühendislik ve Doğa Bilimleri Fakültesi, Otomotiv Mühendisliği Bölümü | EXPERIMENTAL INVESTIGATION OF THE EFFECTS OF WASTE CABLE PLASTIC-DERIVED PYROLYSIS FUEL AND CARBON NANOTUBES ON THE CARBON FOOTPRINT OF A DIESEL ENGINE |
| Prof. Dr. Emrah DENİZ<br>Prof. Dr. Mehmet ÇELİK | Karabük Üniversitesi, Mühendislik Fakültesi | TEMPORAL AND VERTICAL CHARACTERIZATION OF SIDEWALL SHADING IN SOLAR PONDS BASED ON SOLAR GEOMETRY |
| Prof. Dr. Emrah DENİZ | Karabük Üniversitesi, Mühendislik Fakültesi | RADIATION DISTRIBUTION ACROSS WATER SURFACE AND DEPTH IN SOLAR PONDS ACCORDING TO SOLAR GEOMETRY, AND DESIGN EFFECTS |
| Asst. Prof. Dr. Oğuz Kürşat DEMİRCİ | Erzincan Binali Yıldırım University, Vocational High School, Department of Mechanics and Metal Works, Machining Technician Programme | THE EVOLVING LANDSCAPE OF ELECTRIC VEHICLES: A SYSTEMATIC REVIEW OF TECHNOLOGICAL ADVANCES, INFRASTRUCTURE, AND SUSTAINABILITY |
| Assoc. Prof. Dr. Ali KAHRAMANOĞLU | Ondokuz Mayıs Üniversitesi | LEVELS OF ARTIFICIAL INTELLIGENCE USAGE AMONG NEW ENTREPRENEURS |
| İrfan ONRAT<br>Asst. Prof. Dr. İlhan TUNÇ | Department of Mechatronics Engineering, Bursa TechnicalUniversity, Bursa, Turkey | DEVELOPMENT OF A TRADING AGENT BASED ON DQN AND FUZZY LOGIC |

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*December 20-25, 2025 PARIS*

**ONLINE**

| 20.12.2025 | HALL-4/SESSION-1 |
|---|---|
| PARIS | TÜRKİYE TIME: 19:35-22:00 |

**CHAIR:** Prof. Dr. F. Demet AYKAL

**CHAIR VICE:** Res. Asst. Hacer ÖZYANIKOĞLU

| Author(s) | Affiliation | Title |
|---|---|---|
| Işılay GENÇ<br>Prof. Dr. F. Demet AYKAL | Dicle Üniversitesi, Mimarlık Fakültesi | THE CULTURAL LANDSCAPE AND ARCHITECTURAL IDENTITY OF MİDYAT–ANITLI (HAH) VILLAGE |
| Ecrin KAR<br>Prof. Dr. Aybike Ayfer KARADAĞ | Bağımsız Araştırmacı<br>&<br>Düzce Üniversitesi, Orman Fakültesi, Peyzaj Mimarlığı Bölümü Konuralp Yerleşkesi, Düzce | SPATIAL IMPACT OF DISASTER PLANNİNG DECISIONS: ANALYSIS OF LAND COVER CHANGE DYNAMICS IN DÜZCE (1990–2021) |
| Elif SANCAKLI<br>Prof. Dr. Aybike Ayfer KARADAĞ | Bağımsız Araştırmacı<br>&<br>Düzce Üniversitesi, Orman Fakültesi, Peyzaj Mimarlığı Bölümü Konuralp Yerleşkesi, Düzce | ASSESSING THE CARBON FOOTPRINT POTENTIAL OF URBAN PARKS: THE CASE OF SEKA PARK, İZMİT - TÜRKİYE |
| Asst. Prof. Dr. Damla YILDIZ | Karabük Üniversitesi Orman Fakültesi Orman Mühendisliği Bölümü, Ormancılık Politikası ve Yönetimi Ana Bilim Dalı, Karabük/TÜRKİYE | ANALYSIS OF FOREST CRIMES FROM THE PAST TO THE PRESENT (1988-2024) |
| Asst. Prof. Dr. Damla YILDIZ | Karabük Üniversitesi Orman Fakültesi Orman Mühendisliği Bölümü, Ormancılık Politikası ve Yönetimi Ana Bilim Dalı, Karabük/TÜRKİYE | A BIBLIOMETRIC ANALYSIS OF STUDIES ON FOREST CRIMES IN TURKIYE BASED ON POSTGRADUATE THESES |
| Prof. Dr. Fisun Gürsel ÇELİKEL | Ondokuz Mayıs University, Department of Horticulture, Samsun, Türkiye | DIFFERENT USAGES OF Gardenia jasminoides PLANTS |
| Prof. Dr. Fisun Gürsel ÇELİKEL | Ondokuz Mayıs University, Department of Horticulture, Samsun, Türkiye | BUD DEVELOPMENT AND HARVEST STAGES OF GARDENIA FLOWERS |
| Res. Asst. Hacer ÖZYANIKOĞLU<br>Asst. Prof. Dr. Levent ÇORUH | Kapadokya Üniversitesi, Mimarlık, Tasarım ve Güzel Sanatlar Fakültesi<br>&<br>Erciyes Üniversitesi, Güzel Sanatlar Fakültesi | AN EVALUATION OF THE ABSENCE OF GRAPHIC DESIGN SYSTEMS WITHIN THE URBAN FABRIC: THE CASE OF ÜRGÜP |
| Gülden ERDEN<br>Assoc. Prof. Dr. Betül DUMAN BAY | Yıldız Teknik Üniversitesi, Sosyoloji Yüksek Lisans<br>&<br>Yıldız Teknik Üniversitesi, Fen-Edebiyat Fakültesi | INFORMALITY AND DETRANSFORMATION: THE CASE OF OKMEYDANI IN THE PROCESS OF NEOLIBERAL URBANIZATION |
| Assoc. Prof. Dr. Serpil YORGANCI | Atatürk Üniversitesi, Teknik Bilimler Meslek Yüksekokulu, Kazim Karabekir Eğitim Fakültesi, Matematik ve Fen Bilimleri Eğitimi Bölümü, Erzurum. | STUDENTS' CRITICAL THINKING DISPOSITIONS IN GEOGEBRA-SUPPORTED ONLINE LEARNING ENVIRONMENT |
| Assoc. Prof. Dr. Serpil YORGANCI | Atatürk Üniversitesi, Teknik Bilimler Meslek Yüksekokulu, Kazim Karabekir Eğitim Fakültesi, Matematik ve Fen Bilimleri Eğitimi Bölümü, Erzurum. | THE EFFECT OF E-BOOK-SUPPORTED BLENDED LEARNING ENVIRONMENT ON STUDENT ACHIEVEMENT |

# 5th INTERNATIONAL PARIS APPLIED SCIENCE CONGRESS

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**ONLINE**

| 20.12.2025 | HALL-5/SESSION-1 |
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| PARIS | TÜRKİYE TIME: 19:35-22:00 |

**CHAIR:** Prof. Dr. Semra ERPOLAT TAŞABAT

**CHAIR VICE:** Assoc. Prof. Dr. Abdullah SEVİN

| Author(s) | Affiliation | Title |
|---|---|---|
| Prof. Dr. Semra ERPOLAT TAŞABAT | Mimar Sinan Fine Art University, Department of Statistics, İstanbul, Türkiye | CONCEPTUAL RELATIONSHIP EXTRACTION: NLP-DRIVEN APPROACH TO MEDICAL TEXT ANALYSIS |
| Prof. Dr. Semra ERPOLAT TAŞABAT | Mimar Sinan Fine Art University, Department of Statistics, İstanbul, Türkiye | KNOWLEDGE REPRESENTATION IN TEXT MINING AND NATURAL LANGUAGE PROCESSING |
| Çağla KONAT<br>Dr. Şükrü Mustafa KAYA | Istanbul Aydın University, Institute of Postgraduate Education, Department of Public Relations and Publicity<br>&<br>Istanbul Aydin University, Department of Computer Technologies, | PUBLIC RELATIONS IN THE AGE OF GENERATIVE ARTIFICIAL INTELLIGENCE: STRATEGIC COMMUNICATION, CONTENT PRODUCTION, AND REDEFINING ETHICAL BOUNDARIES |
| Assoc. Prof. Dr. Abdullah SEVİN | Sakarya Üniversitesi, Bilgisayar ve Bilişim Bilimleri Fakültesi, Bilgisayar Mühendisliği Bölümü, Sakarya. | EVALUATION OF CRYPTOGRAPHIC PSEUDO-RANDOM NUMBER GENERATORS |
| Assoc. Prof. Dr. Abdullah SEVİN | Sakarya Üniversitesi, Bilgisayar ve Bilişim Bilimleri Fakültesi, Bilgisayar Mühendisliği Bölümü, Sakarya. | COMPARISON OF PSEUDO-RANDOM NUMBER GENERATORS USED IN SIMULATIONS |
| Çağla ÇINAR<br>Prof. Dr. Çağın KANDEMİR ÇAVAŞ | Dokuz Eylül Üniversitesi, Fen Bilimleri Enstitüsü, Bilgisayar Bilimleri Anabilim Dalı<br>&<br>Dokuz Eylül Üniversitesi, Fen Fakültesi, Bilgisayar Bilimleri Bölümü | METHODOLOGY FOR SELECTING NON-INTERACTING PROTEIN PAIRS USING LZ COMPLEXITY THERESHOLDS |
| Assoc. Prof. Dr. Mehmet KARACA<br>Prof. Dr. Raşit URHAN | Pamukkale University, Denizli Vocational School of Technical Sciences, Department of Electronics and Automation, Denizli, Türkiye<br>&<br>Pamukkale University, Faculty of Sciences, Department of Biology, Denizli, Türkiye | FIRST REPORT OF ZERCON TRIANGULARIS C. L. KOCH, 1836 (ACARI: ZERCONIDAE) FROM TÜRKİYE |
| Assoc. Prof. Dr. Mehmet KARACA<br>Prof. Dr. Raşit URHAN | Pamukkale University, Denizli Vocational School of Technical Sciences, Department of Electronics and Automation, Denizli, Türkiye<br>&<br>Pamukkale University, Faculty of Sciences, Department of Biology, Denizli, Türkiye | MITES OF THE FAMILY ZERCONIDAE (ACARI: MESOSTIGMATA) RECORDED FROM THE AEGEAN REGION (TÜRKİYE) |
| Assoc. Prof. Dr. Aslı KAVURMACI | Bandırma Onyedi Eylül Üniversitesi, İktisadi ve İdari Bilimler Fakültesi, Çalışma Ekonomisi ve Endüstri İlişkileri Bölümü | TECHNOLOGY-SUPPORTED AGING: THE SEARCH FOR NEW CARE MODELS IN SOCIAL SERVICES |

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*December 20-25, 2025 PARIS*

**ONLINE**

| 20.12.2025 | HALL-6/SESSION-1 |
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| PARIS | TÜRKİYE TIME: 19:35-22:00 |

**CHAIR:** Assoc. Prof. Dr. Yasemin ŞANLI

**CHAIR VICE:** Asst. Prof. Dr Emre Şefik Çağlar

| Author(s) | Affiliation | Title |
|---|---|---|
| Safiye Pelin TÜRKYILMAZ | Bağımsız Araştırmacı | REHABILATION OF LATERAL TOOTH AGENESIS WITH A MARYLAND BRIDGE: A CASE REPORT |
| Lecturer Dr. Canan ASAL ULUS<br>Prof. Dr. Pınar SÖKÜLMEZ KAYA<br>Elif ZOLAN BAYRAM | Ondokuz Mayıs Üniversitesi, Sağlık Bilimleri Fakültesi<br>&<br>Bağımsız Araştırmacı | EVALUATION OF 112 HEALTHCARE WORKERS NUTRITIONAL HABITS |
| Lecturer Dr. Canan ASAL ULUS<br>Prof. Dr. Pınar SÖKÜLMEZ KAYA | Ondokuz Mayıs Üniversitesi, Sağlık Bilimleri Fakültesi | ASSESSMENT OF NUTRITIONAL STATUS OF HEALTHCARE TEAM WORKING IN INTENSIVE CARE UNIT |
| Assoc. Prof. Dr. Yasemin ŞANLI<br>Asst. Prof. Dr. Ahmet ŞANLI | Karamanoğlu Mehmetbey Üniversitesi, Sağlık Bilimleri Fakültesi Ebelik Bölümü,<br>&<br>Karamanoğlu Mehmetbey Üniversitesi Tıp Fakültesi Cerrahi Tıp Bilimleri Bölümü Üroloji Anabilim Dalı | OBESITY AND SEXUAL FUNCTIONS |
| Assoc. Prof. Dr. Yasemin ŞANLI<br>Asst. Prof. Dr. Ahmet ŞANLI | Karamanoğlu Mehmetbey Üniversitesi, Sağlık Bilimleri Fakültesi Ebelik Bölümü,<br>&<br>Karamanoğlu Mehmetbey Üniversitesi Tıp Fakültesi Cerrahi Tıp Bilimleri Bölümü Üroloji Anabilim Dalı | CONSERVATIVE APPROACHES IN THE MANAGEMENT OF URINARY INCONTINENCE IN WOMEN |
| İlayda KIRAÇ<br>Zelal AKTEPE<br>Melisa COŞKUN<br>Sümeyye ÖZBEK<br>Assoc. Prof. Dr. Mahruk GÜNEYLİ | Istanbul Gelisim University Faculty Of Health Sciences<br>(Nursing) | DIABETIC NEURAPATHY |
| Rümeysa BİLGİ<br>Assoc. Prof. Dr. Çetin SAYACA | Bursa Uludag University, Faculty of Health Sciences, Department of Physiotherapy and Rehabilitation, Bursa, Türkiye<br>&<br>Bursa Uludag University, Faculty of Health Sciences, Department of Physiotherapy and Rehabilitation, Bursa, Türkiye | INVESTIGATION INTO THE RELATIONSHIP BETWEEN SMARTPHONE USAGE DURATION AND CRANIOCERVICAL ANGLE, PAIN THRESHOLD, SLEEP QUALITY, AND OVERALL ACADEMIC PERFORMANCE AVERAGE |
| Asst. Prof. Dr. Emre Şefik Çağlar<br>Dr. Emine Saldamlı | Sağlık Bilimleri Üniversitesi, Hamidiye Eczacılık Fakültesi, Farmasötik Biyoteknoloji Anabilim Dalı<br>&<br>İstanbul Üniversitesi, Eczacılık Fakültesi, Farmasötik Teknoloji Anabilim Dalı | COMPARATİVE IN VITRO RELEASE KINETICS AND SIMILARITY ANALYSIS OF A ZONISAMİDE-LOADED SELF EMULSIFYING DRUG DELIVERY SYSTEM AND FREE DRUG |
| Asst. Prof. Dr. Emre Şefik Çağlar<br>Sude Balıkuv Sevim<br>Neslihan Üstündağ Okur | University of Health Sciences, Faculty of Pharmacy, Department of Pharmaceutical Biotechnology, Üsküdar, İstanbul<br>&<br>University of Health Sciences, Faculty of Pharmacy, Üsküdar, İstanbul<br>&<br>University of Health Sciences, Faculty of Pharmacy, Department of Pharmaceutical Biotechnology, Üsküdar, İstanbul | EMULGEL FORMULATIONS AND GENERAL EVALUATION |

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| 20.12.2025 | HALL-7/SESSION-1 |
|  PARIS |  TÜRKİYE TIME: 19:35-22:00 |

**CHAIR:** Prof. Dr. Mehmet Salih SAYAR
**CHAIR VICE:** Asst. Prof. Dr. Canan CANAL

| Author(s) | Affiliation | Title |
|---|---|---|
| Güler KARACA<br>Assoc. Prof. Dr. Fahri ALİÇAVUŞ | Çanakkale Onsekız Mart University, School of Graduate Studies, Department of Physics, 17100 Çanakkale, Türkiye<br>&<br>Çanakkale Onsekız Mart University, Faculty of Science, Department of Physics, 17100 Çanakkale, Türkiye | DETERMINATION OF PHYSICAL PARAMETERS OF BINARY STARS IN THE NGC 2168 OPEN CLUSTER USING TESS OBSERVATIONS |
| İbrahim DAĞCI<br>Assoc. Prof. Dr. Yağmur ÜNVER | Atatürk University, Institute of Science, Department of Molecular Biology and Genetics, Erzurum, Türkiye<br>&<br>Atatürk University, Faculty of Science, Department of Molecular Biology and Genetics, Erzurum, Türkiye. | BRIDGE RECOMBINASES and PROGRAMMABLE RNA-GUIDED DNA EDITING |
| İbrahim DAĞCI<br>Assoc. Prof. Dr. Yağmur ÜNVER | Atatürk University, Institute of Science, Department of Molecular Biology and Genetics, Erzurum, Türkiye<br>&<br>Atatürk University, Faculty of Science, Department of Molecular Biology and Genetics, Erzurum, Türkiye. | THE EFFECT of ALTERNATING MAGNETIC FIELD on AZURIN SECRETION from Pseudomonas aeruginosa |
| Assoc. Prof. Dr. Ferhunde Aysin<br>Assoc. Prof. Dr. Nihal Simsek Ozek<br>Assoc. Prof. Dr. Kubra Koc | Department of Biology, Faculty of Science, Ataturk University, Erzurum, TURKEY | BROMELAIN AS A SELECTIVE CYTOTOXIC AGENT: A PRELIMINARY IN VITRO EVALUATION IN LUNG CELL MODELS |
| Şeyma Nur BİLGİÇ<br>Şeyma ÖZKAN<br>Asst. Prof. Dr. Canan CANAL | Artuklu Üniversitesi, Lisansüstü Eğitim Enstitüsü, Gıda Mühendisliği<br>&<br>Artuklu Üniversitesi, Mardin Meslek Yüksek Okulu | THE ROLE OF MARDIN'S TRADITIONAL GRAPE-BASED PRODUCTS IN SUSTAINABLE GASTRONOMY TOURISM |
| Şeyma ÖZKAN<br>Şeyma Nur BİLGİÇ<br>Asst. Prof. Dr. Canan CANAL | Artuklu Üniversitesi, Lisansüstü Eğitim Enstitüsü, Gıda Mühendisliği<br>&<br>Artuklu Üniversitesi, Mardin Meslek Yüksek Okulu | MARDIN'S LOCAL AND GEOGRAPHICALLY INDICATED PRODUCTS IN TERMS OF FUNCTIONAL FOOD POTENTIAL: A STUDY ON 'MIDYAT CUCUMBER AND MELON' |
| Prof. Dr. Mehmet Salih SAYAR<br>Mehmet Şahin UÇAK | Dicle Üniversitesi, Bismil Meslek Yüksekokulu, Bitkisel ve Hayvansal Üretim Bölümü<br>&<br>Dicle Üniversitesi Fen Bilimleri Enstitüsü Tarla Bitkileri Anabilim Dalı | DETERMINING THE EFFECT OF DIFFERENT SEEDING RATES ON SOME AGRONOMIC CHARACTERISTICS IN TRITICALE VARIETIES |

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|---|---|
| 20.12.2025 | HALL-8/SESSION-1 |
| PARIS | TÜRKİYE TIME: 19:35-22:00 |

**CHAIR:** Asst. Prof. Melikşah TURAN
**CHAIR VICE:** Res. Asst. Zümral ERDEM

| Author(s) | Affiliation | Title |
|---|---|---|
| Chansy PHOMPHITHAK<br>Anousone SISOULATH<br>Dalasouk KHAMLOUNVILAIVONG<br>Soulichanh LUANGSOMBATH | Champasak College of Health Sciences, Laos<br>&<br>Vice Dean, Faculty of Nursing Sciences, University of Health Sciences<br>&<br>Head, Department of Child Health Nursing, Faculty of Nursing Sciences, University of Health Sciences | RISK FACTORS FOR PNEUMONIA IN STROKE PATIENTS: A SYSTEM REVIEW |
| Edanur ÇELİK<br>Asst. Prof. Dr. Melikşah TURAN<br>Asst. Prof. Dr. Vildan ORAL | Erzurum Technical University, Faculty of Health Sciences | MEDICAL ASPECTS OF URBAN SEARCH AND RESCUE OPERATIONS: EVIDENCE-BASED MANAGEMENT OF CRUSH AND COMPARTMENT SYNDROME CASES |
| Eda KUŞÇU<br>Asst. Prof. Melikşah TURAN | Erzurum Technical University, Faculty of Health Sciences | DIGITAL INFORMATION SEEKING IN TIMES OF CRISIS: A QUALITATIVE EXAMINATION OF THE USE OF AFAD'S WEB AND SOCIAL MEDIA RESOURCES DURING THE 2023 KAHRAMANMARAŞ EARTHQUAKES |
| Esma FİDAN<br>Res. Asst. Zümral ERDEM<br>Zeynep ERTÜK<br>Umut Ziya BAYRAM | Erzurum Technical University, Faculty of Health Sciences | DISASTER RISK MANAGEMENT IN LIBRARIES: A CASE STUDY ON ERZURUM TECHNICAL UNIVERSITY LIBRARY |
| Ayşe HANDİL<br>Asst. Prof. Dr. Vildan ORAL | Erzurum Technical University, Faculty of Health Sciences | SOLUTION SUGGESTIONS FOR POST-DISASTER: HYGIENIC TOILET DESIGN |
| Sedanur YILDIRIM<br>Res. Asst. Zümral ERDEM | Erzurum Technical University, Faculty of Health Sciences | DISASTER AND EMERGENCY PREPAREDNESS OF REHABILITATION CENTERS: A QUALITATIVE STUDY IN THE ERZURUM EXAMPLE |
| Assoc. Prof. Dr. Ayşegül Özcan ALGÜL | Nevşehir Hacı Bektaş Veli ÜNİVERSİTESİ, Semra ve Vefa Küçük Sağlık Bilimleri Fakültesi, Nevşehir- Türkiye | DETERMINING THE ATTITUDES TOWARDS GENDER OF STUDENTS TAKING THE ELECTIVE GENDER EQUALITY COURSE |
| Şeyhmus KAYDU<br>Ayşegül ÖZCAN ALGÜL | Nevşehir Hacı Bektaş Veli Üniversitesi Fen Bilimleri Enstitüsü Yl Öğrencisi<br>&<br>Nevşehir Hacı Bektaş Veli ÜNİVERSİTESİ, Semra ve Vefa Küçük Sağlık Bilimleri Fakültesi, Nevşehir- Türkiye | KÜLTÜREL SAĞLIK MİRASI VE ÇEVRE BİLİNCİ: KAPADOKYA ÖRNEĞI |

## ÖNEMLİ, DİKKATLE OKUYUNUZ LÜTFEN / IMPORTANT, PLEASE READ CAREFULLY

### Önemli, Dikkatle Okuyunuz Lütfen

- ✓ Kongremizde Yazım Kurallarına uygun gönderilmiş ve bilim kurulundan geçen bildiriler için online (video konferans sistemi üzerinden) sunum imkanı sağlanmıştır.
- ✓ Online sunum yapabilmek için **https://zoom.us/join** sitesi üzerinden giriş yaparak "Meeting ID or Personal Link Name" yerine ID numarasını girerek oturuma katılabilirsiniz.
- ✓ Zoom uygulaması ücretsizdir ve hesap oluşturmaya gerek yoktur.
- ✓ Zoom uygulaması kaydolmadan kullanılabilir.
- ✓ Uygulama tablet, telefon ve PC'lerde çalışıyor.
- ✓ Her oturumdaki sunucular, sunum saatinden 15 dk öncesinde oturuma bağlanmış olmaları gerekmektedir.
- ✓ Tüm kongre katılımcıları canlı bağlanarak tüm oturumları dinleyebilir.
- ✓ Moderatör – oturumdaki sunum ve bilimsel tartışma (soru-cevap) kısmından sorumludur.

### Dikkat Edilmesi Gerekenler- TEKNİK BİLGİLER

- ✓ Bilgisayarınızda mikrofon olduğuna ve çalıştığına emin olun.
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- ✓ All congress participants can connect live and listen to all sessions.
- ✓ Moderator is responsible for the presentation and scientific discussion (question-answer) section of the session.

### Points to Take into Consideration - TECHNICAL INFORMATION

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**Meeting ID: 460 363 6838**
**Passcode: 121314**

# Opening Ceremony

Online

*Date:* **December 22, 2025**

*Time:* *12:30*

**Meeting Link:**
https://us06web.zoom.us/j/4603636838?pwd=Gx9rIRf5cUTPsZZ4pilDYkYWaaEAc6.1&omn=81036914574

**Meeting ID:** **460 363 6838**
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- *Speakers must be connected to the session 10 minutes before the presentation time.*
- *Online presentations; Presentation time is 10 minutes. There is 5 minutes of question and answer time.*
- *All congress participants can connect live and listen to all sessions.*
- *During the session, your camera should be turned on at least %70 of session period*
- *Moderator is responsible for the presentation and scientific discussion (question-answer) section of the session.*

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- *You should be able to use screen sharing feature in Zoom.*
- *Attendance certificates will be sent to you as pdf at the end of the congress.*
- *Moderator is responsible for the presentation and scientific discussion (question-answer) section of the session.*

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# 5th INTERNATIONAL PARIS APPLIED SCIENCE CONGRESS

*December 20-25, 2025 PARIS*

**ONLINE**

| 22.12.2025 | HALL-1/SESSION-1 |
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| PARIS | TÜRKİYE TIME: 12:30-14:30 |

**CHAIR:** Dr. Ahmed MUSA

| Author(s) | Affiliation | Title |
|---|---|---|
| Dr. Ahmed MUSA | University of Lagos, Department of Electrical Engineering, Nigeria | APPLICATION OF SOLAR MICROGRID SYSTEMS IN RURAL ENERGY ACCESS |
| MsC. Maria SANTOS John REYES | De La Salle University, Department of Environmental Science, Philippines Independent Researcher, Philippines | SUSTAINABLE WATER MANAGEMENT USING LOW-COST FILTRATION TECHNOLOGIES |
| Dr. Rajesh KUMAR Anjali SHARMA MsC. Pooja MEHTA | Indian Institute of Technology Delhi, Department of Mechanical Engineering, India University of Rajasthan, Department of Physics, India Independent Researcher, India | EXPERIMENTAL ANALYSIS OF HEAT TRANSFER ENHANCEMENT TECHNIQUES |
| Somchai PRASERT | Chulalongkorn University, Department of Computer Engineering, Thailand | MACHINE LEARNING BASED TRAFFIC FLOW PREDICTION MODELS |
| Dr. Michael JOHNSON Sarah LEE MsC. Robert WILSON | University of California, Department of Civil Engineering, USA Stanford University, Department of Data Science, USA Independent Researcher, USA | SMART CITY INFRASTRUCTURE MONITORING USING IOT SYSTEMS |
| Dr. Ayesha KHAN | University of Karachi, Department of Biotechnology, Pakistan | BIOREMEDIATION POTENTIAL OF INDIGENOUS MICROORGANISMS |
| Ali HUSSEIN MsC. Noor AL-HASSANI | University of Baghdad, Department of Information Technology, Iraq Middle Technical University, Department of Software Engineering, Iraq | DESIGN AND IMPLEMENTATION OF SECURE DATABASE SYSTEMS |
| MsC. Emmanuel OKAFOR Grace ADEYEMI | Federal University of Technology Akure, Department of Agricultural Engineering, Nigeria Independent Researcher, Nigeria | AUTOMATION TECHNIQUES IN PRECISION AGRICULTURE APPLICATIONS |
| Dr. Jonathan MILLER | Texas A&M University, Department of Materials Science, USA | MECHANICAL PERFORMANCE OF ADVANCED COMPOSITE MATERIALS |
| MsC. Fatima NOOR Dr. Salman QURESHI Adeel MALIK Sana IQBAL Umar RAZA | National University of Sciences and Technology, Department of Renewable Energy Engineering, Pakistan COMSATS University Islamabad, Department of Electrical Engineering, Pakistan Independent Researcher, Pakistan Independent Researcher, Pakistan Independent Researcher, Pakistan | OPTIMIZATION OF HYBRID RENEWABLE ENERGY SYSTEMS FOR URBAN AREAS |

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# 5th INTERNATIONAL PARIS APPLIED SCIENCE CONGRESS

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**ONLINE**

| 22.12.2025 | HALL-2/SESSION-1 |
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| PARIS | TÜRKİYE TIME: 12:30-14:30 |

**CHAIR:** Dr. Laura ANDERSON

| Author(s) | Affiliation | Title |
|---|---|---|
| Dr. Ibrahim SULE | Ahmadu Bello University, Department of Chemical Engineering, Nigeria | EXPERIMENTAL STUDY ON BIOFUEL PRODUCTION FROM AGRICULTURAL WASTE |
| MsC. Liza CRUZ<br>Mark DELA ROSA | University of the Philippines Los Baños, Department of Food Science, Philippines Independent Researcher, Philippines | QUALITY ASSESSMENT OF FUNCTIONAL FOOD PRODUCTS |
| Dr. Vikram PATEL<br>MsC. Neha GUPTA<br>Rohan MALHOTRA | Gujarat Technological University, Department of Electronics Engineering, India Independent Researcher, India Independent Researcher, India | DEVELOPMENT OF EMBEDDED SYSTEMS FOR SMART HOME APPLICATIONS |
| Anan KITTIPONG | King Mongkut's University of Technology Thonburi, Department of Industrial Engineering, Thailand | OPTIMIZATION OF MANUFACTURING PROCESSES USING LEAN TECHNIQUES |
| Dr. Laura ANDERSON<br>MsC. Kevin BROWN | University of Michigan, Department of Environmental Engineering, USA Independent Researcher, USA | ASSESSMENT OF AIR QUALITY MONITORING SYSTEMS IN URBAN AREAS |
| MsC. Hamza RAZA | University of Engineering and Technology Lahore, Department of Mechanical Engineering, Pakistan | NUMERICAL INVESTIGATION OF TURBULENT FLOW CHARACTERISTICS |
| Dr. Yasin ALI<br>Noor HASSAN<br>Ahmed SALMAN | University of Mosul, Department of Civil Engineering, Iraq Independent Researcher, Iraq Independent Researcher, Iraq | STRUCTURAL PERFORMANCE OF REINFORCED CONCRETE MATERIALS |
| MsC. Blessing AJAYI<br>Daniel OYEWOLE | University of Ibadan, Department of Agricultural Economics, Nigeria Independent Researcher, Nigeria | DATA DRIVEN APPROACHES IN AGRICULTURAL PRODUCTION PLANNING |
| Dr. Steven CLARK | Arizona State University, Department of Information Systems, USA | BIG DATA ANALYTICS FOR DECISION SUPPORT SYSTEMS |
| MsC. Amina FAROOQ<br>Dr. Tariq MAHMOOD<br>Salman AKHTAR<br>Nadia SHEIKH | International Islamic University Islamabad, Department of Computer Science, Pakistan COMSATS University Islamabad, Department of Software Engineering, Pakistan Independent Researcher, Pakistan Independent Researcher, Pakistan | CYBER SECURITY RISK ASSESSMENT IN CLOUD COMPUTING ENVIRONMENTS |

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| PARIS | TÜRKİYE TIME: 12:30-14:30 |

**CHAIR:** Dr. Christopher TURNER

| Author(s) | Affiliation | Title |
|---|---|---|
| Dr. Samuel ADENIYI | Obafemi Awolowo University, Department of Computer Science, Nigeria | DESIGN OF INTELLIGENT DECISION SUPPORT SYSTEMS |
| MsC. Angelica RAMOS<br>Jose MANALO | Polytechnic University of the Philippines, Department of Industrial Engineering, Philippines Independent Researcher, Philippines | PRODUCTIVITY ANALYSIS USING TIME STUDY TECHNIQUES |
| Dr. Arvind SINGH<br>MsC. Kavita JAIN | Banaras Hindu University, Department of Civil Engineering, India Independent Researcher, India | SEISMIC PERFORMANCE EVALUATION OF BUILDING STRUCTURES |
| Narin SUKSAI | Chiang Mai University, Department of Environmental Engineering, Thailand | WASTE MANAGEMENT STRATEGIES FOR URBAN SUSTAINABILITY |
| Dr. Emily CARTER<br>MsC. Brian HARRIS<br>Luke MARTIN | University of Washington, Department of Mechanical Engineering, USA Independent Researcher, USA Independent Researcher, USA | PERFORMANCE ANALYSIS OF ENERGY EFFICIENT HVAC SYSTEMS |
| MsC. Usman LATIF | Mehran University of Engineering and Technology, Department of Electrical Engineering, Pakistan | CONTROL STRATEGIES FOR POWER ELECTRONIC CONVERTERS |
| Dr. Kareem ABDULLAH<br>MsC. Huda JABBAR | University of Technology, Department of Materials Engineering, Iraq Independent Researcher, Iraq | SYNTHESIS AND CHARACTERIZATION OF NANOSTRUCTURED MATERIALS |
| MsC. Victoria AGBEDE<br>Paul OJO<br>Samuel OLANREWAJU | Ladoke Akintola University of Technology, Department of Mechanical Engineering, Nigeria Independent Researcher, Nigeria Independent Researcher, Nigeria | EXPERIMENTAL INVESTIGATION OF THERMAL INSULATION MATERIALS |
| Dr. Christopher TURNER | Purdue University, Department of Industrial Engineering, USA | OPTIMIZATION MODELS FOR SUPPLY CHAIN MANAGEMENT |
| MsC. Saira NASREEN<br>Dr. Imran HAQ<br>Ahsan ZAFAR<br>Mehwish ASLAM<br>Faizan IQBAL | University of the Punjab, Department of Environmental Sciences, Pakistan COMSATS University Islamabad, Department of Management Sciences, Pakistan Independent Researcher, Pakistan Independent Researcher, Pakistan Independent Researcher, Pakistan | ENVIRONMENTAL IMPACT ASSESSMENT OF INDUSTRIAL DEVELOPMENT PROJECTS |

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**ONLINE**

| 22.12.2025 | HALL-4/SESSION-1 |
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| PARIS | TÜRKİYE TIME: 12:30-14:30 |

**CHAIR:** Dr. Hassan MOHAMMED

| Author(s) | Affiliation | Title |
|---|---|---|
| Dr. Oluwaseun ADEBAYO | University of Ilorin, Department of Physics, Nigeria | Dr. Oluwaseun ADEBAYO |
| MsC. Rhea DOMINGUEZ<br>Carlo NAVARRO | Ateneo de Manila University, Department of Information Technology, Philippines Independent Researcher, Philippines | MsC. Rhea DOMINGUEZ Carlo NAVARRO |
| Dr. Manish AGARWAL<br>MsC. Shweta KAPOOR<br>Rahul VERMA | National Institute of Technology Jaipur, Department of Chemical Engineering, India Independent Researcher, India Independent Researcher, India | Dr. Manish AGARWAL MsC. Shweta KAPOOR Rahul VERMA |
| Pichaya CHAIYASIT | Kasetsart University, Department of Agricultural Engineering, Thailand | Pichaya CHAIYASIT |
| Dr. Natalie ROBERTS<br>MsC. Eric WALKER | Colorado State University, Department of Environmental Health, USA Independent Researcher, USA | Dr. Natalie ROBERTS MsC. Eric WALKER |
| MsC. Bilal SAEED | University of Gujrat, Department of Industrial Engineering, Pakistan | MsC. Bilal SAEED |
| Dr. Hassan MOHAMMED<br>MsC. Lina SAEED<br>Omar KHALIL | University of Basrah, Department of Marine Engineering, Iraq Independent Researcher, Iraq Independent Researcher, Iraq | Dr. Hassan MOHAMMED MsC. Lina SAEED Omar KHALIL |
| MsC. Deborah AKINOLA<br>Ibrahim LAWAL | Federal University of Technology Minna, Department of Water Resources Engineering, Nigeria Independent Researcher, Nigeria | MsC. Deborah AKINOLA Ibrahim LAWAL |
| Dr. Matthew GREEN | North Carolina State University, Department of Textile Engineering, USA | Dr. Matthew GREEN |
| MsC. Nida ANWAR<br>Dr. Faisal JAVED<br>Kamran SHAH | University of Management and Technology Lahore, Department of Energy Engineering, Pakistan University of Engineering and Technology Taxila, Department of Mechanical Engineering, Pakistan Independent Researcher, Pakistan | MsC. Nida ANWAR Dr. Faisal JAVED Kamran SHAH |

| 5th INTERNATIONAL PARIS APPLIED SCIENCE CONGRESS<br>December 20-25, 2025 PARIS<br>ONLINE | |
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| PARIS | TÜRKİYE TIME: 12:30-14:30 |

**CHAIR:** Dr. Andrew COLLINS

| Author(s) | Affiliation | Title |
|---|---|---|
| Dr. Abdulrahman SADIQ<br>MsC. Musa BELLO | Bayero University Kano, Department of Mechanical Engineering, Nigeria | PERFORMANCE ANALYSIS OF COMPACT HEAT EXCHANGERS |
| Janine TORRES<br>Carlo MENDOZA<br>Luis GARCIA | Mapúa University, Department of Civil Engineering, Philippines | STRUCTURAL BEHAVIOR OF HIGH STRENGTH CONCRETE MIXES |
| Dr. Nikhil JOSHI<br>Ritu SAXENA | Delhi Technological University, Department of Electrical Engineering, India | FAULT DETECTION TECHNIQUES IN POWER TRANSMISSION SYSTEMS |
| Prakit SIRIPONG<br>Nattawut PHANOM | Suranaree University of Technology, Department of Industrial Engineering, Thailand | PRODUCTION LINE BALANCING USING SIMULATION METHODS |
| Dr. Andrew COLLINS<br>Rebecca HALL<br>Thomas YOUNG | Ohio State University, Department of Computer Science, USA | DEEP LEARNING APPROACHES FOR IMAGE CLASSIFICATION |
| Imran YOUSAF<br>Adeel HAMEED | University of Agriculture Faisalabad, Department of Agricultural Engineering, Pakistan | DESIGN OF IRRIGATION SYSTEMS FOR WATER USE EFFICIENCY |
| Dr. Saif ALI<br>Zainab KAREEM<br>Hassan RIDHA | University of Babylon, Department of Environmental Engineering, Iraq | WASTEWATER TREATMENT USING NATURAL FILTRATION METHODS |
| Esther OLUWAFEMI<br>Samuel DARAMOLA | Ekiti State University, Department of Computer Engineering, Nigeria | EMBEDDED SYSTEM DESIGN FOR SMART MONITORING DEVICES |
| Dr. Patrick O'NEILL<br>Laura BENNETT | University of Florida, Department of Agricultural Sciences, USA | TECHNOLOGICAL INNOVATIONS IN POST HARVEST PROCESSING |
| Rabia SULTAN<br>Dr. Kamal AZIZ<br>Farhan MAJEED | University of Engineering and Technology Taxila, Department of Materials Engineering, Pakistan | MECHANICAL CHARACTERIZATION OF METAL MATRIX COMPOSITES |

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| 22.12.2025 | HALL-6/SESSION-1 |
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| PARIS | TÜRKİYE TIME: 12:30-14:30 |

**CHAIR:** Dr. Hassan TUNDE

| Author(s) | Affiliation | Title |
|---|---|---|
| Dr. Hassan TUNDE<br>Sadiq MUSA | Federal University of Technology Owerri, Department of Electrical Engineering, Nigeria | POWER QUALITY IMPROVEMENT IN DISTRIBUTION NETWORKS |
| Elaine VICTORINO<br>Jerome ALVAREZ | Far Eastern University, Department of Computer Engineering, Philippines | REAL TIME MONITORING SYSTEMS FOR INDUSTRIAL APPLICATIONS |
| Dr. Rohit BANSAL<br>Meenal ARORA<br>Karan SINGHAL | Manipal Institute of Technology, Department of Mechanical Engineering, India | NUMERICAL ANALYSIS OF FLUID FLOW IN HEAT PIPES |
| Wichai KONGCHAI<br>Pongsak SRICHAI | Prince of Songkla University, Department of Chemical Engineering, Thailand | KINETIC STUDY OF CATALYTIC REACTION PROCESSES |
| Dr. Kevin MORRIS<br>Hannah PARKER | University of Illinois Urbana-Champaign, Department of Materials Science and Engineering, USA | FATIGUE BEHAVIOR OF HIGH PERFORMANCE ALLOYS |
| Saad ULLAH<br>Bilal KHAN | University of Peshawar, Department of Environmental Sciences, Pakistan | ASSESSMENT OF GROUNDWATER CONTAMINATION LEVELS |
| Dr. Mahmoud SALIM<br>MsC. Rana YOUSIF<br>Omar JABBAR | Al-Nahrain University, Department of Biomedical Engineering, Iraq | DESIGN OF LOW COST MEDICAL DIAGNOSTIC DEVICES |
| Kehinde ADESOJI<br>Tunde OGUN | Lagos State University, Department of Industrial Engineering, Nigeria | ERGONOMIC ANALYSIS OF WORKPLACE DESIGN |
| Dr. William FOSTER<br>Nicole REED | Virginia Tech, Department of Civil Engineering, USA | PERFORMANCE EVALUATION OF PAVEMENT MATERIALS |
| Bushra IQBAL<br>Dr. Naveed AHMED<br>Asad ZAMAN | University of Central Punjab, Department of Electrical Engineering, Pakistan | INTELLIGENT CONTROL METHODS FOR POWER SYSTEM STABILITY |

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| 22.12.2025 | HALL-7/SESSION-1 |
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| PARIS | TÜRKİYE TIME: 12:30-14:30 |

**CHAIR:** Thanawat CHANTHONG

| Author(s) | Affiliation | Title |
|---|---|---|
| Sulaiman ABDUL<br>Hafiz ISMAIL | University of Ilorin, Department of Civil Engineering, Nigeria | LOAD BEARING CAPACITY ANALYSIS OF REINFORCED SLABS |
| Karen LOPEZ<br>Paolo RIVERA<br>Anthony LIM | Technological Institute of the Philippines, Department of Mechanical Engineering, Philippines | THERMAL PERFORMANCE EVALUATION OF COMPACT HEAT SINKS |
| Pankaj MISHRA<br>Ananya BOSE | Jadavpur University, Department of Chemical Engineering, India | MASS TRANSFER ANALYSIS IN GAS ABSORPTION COLUMNS |
| Thanawat CHANTHONG<br>Kittisak RATTANAKUL | Rajamangala University of Technology, Department of Electrical Engineering, Thailand | DESIGN OF ENERGY EFFICIENT MOTOR DRIVE SYSTEMS |
| Aaron MITCHELL<br>Olivia TURNER<br>Ryan COOPER | University of Minnesota, Department of Environmental Engineering, USA | MODELING OF WASTEWATER TREATMENT PROCESSES |
| Shahid MEHMOOD<br>Ahsan PERVAIZ | University of Engineering and Technology Peshawar, Department of Mining Engineering, Pakistan | SAFETY ASSESSMENT IN UNDERGROUND MINING OPERATIONS |
| Nasser HAMEED<br>Zahra ALI<br>Mustafa QASIM | University of Diyala, Department of Computer Engineering, Iraq | FPGA BASED HARDWARE ACCELERATION TECHNIQUES |
| Ayo OLANIYI<br>Ibrahim SADIQ | Kwara State University, Department of Agricultural Engineering, Nigeria | DESIGN OF SOLAR POWERED IRRIGATION SYSTEMS |
| Benjamin ROSS<br>Emily SANDERS | University of Kansas, Department of Industrial Engineering, USA | LINEAR PROGRAMMING MODELS FOR PRODUCTION PLANNING |
| Farzana YASEEN<br>Adnan RASHID<br>Hamza NADEEM | University of Lahore, Department of Biotechnology, Pakistan | MICROBIAL ENZYME PRODUCTION FOR INDUSTRIAL APPLICATIONS |

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| 22.12.2025 | HALL-8/SESSION-1 |
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**CHAIR:** Dr. Jason WRIGHT

| Author(s) | Affiliation | Title |
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| Dr. Abdulazeez LAWAN<br>Sani YAKUBU | Modibbo Adama University of Technology, Department of Mechanical Engineering, Nigeria | PERFORMANCE ANALYSIS OF SOLAR THERMAL COLLECTOR SYSTEMS |
| Andrea FLORES<br>Kenneth BAUTISTA | Central Luzon State University, Department of Agricultural Engineering, Philippines | DESIGN AND EVALUATION OF POST HARVEST DRYING SYSTEMS |
| Dr. Ramesh CHANDRA<br>Priti MALIK<br>Nilesh GUPTA | University of Mumbai, Department of Computer Science, India | OPTIMIZATION OF DATABASE PERFORMANCE IN LARGE SCALE SYSTEMS |
| Kriangsak PHROMDEE<br>Sittichai BOONMA | Naresuan University, Department of Environmental Science, Thailand | ASSESSMENT OF WATER QUALITY USING STATISTICAL METHODS |
| Dr. Jason WRIGHT<br>MsC. Amanda KELLY | University of Nevada Reno, Department of Mining Engineering, USA | ROCK MECHANICS ANALYSIS IN OPEN PIT MINING |
| Asif MAHMOOD<br>Zahid HUSSAIN | Bahauddin Zakariya University, Department of Physics, Pakistan | EXPERIMENTAL STUDY OF SEMICONDUCTOR THIN FILMS |
| . Ahmed YOUSIF<br>Rasha KAMAL<br>Hussein KAREEM | University of Kerbala, Department of Chemical Engineering, Iraq | REACTION KINETICS IN CONTINUOUS FLOW REACTORS |
| Olusegun FASANMI<br>Tobi AKANDE | Federal University of Agriculture Abeokuta, Department of Food Engineering, Nigeria | QUALITY CONTROL TECHNIQUES IN FOOD PROCESSING |
| Nathaniel COLE<br>Sophie RAMIREZ | University of New Mexico, Department of Renewable Energy Engineering, USA | PERFORMANCE EVALUATION OF HYBRID SOLAR WIND SYSTEMS |
| Sidra JAVED<br>Muneeb RIAZ<br>Salman FAROOQ | University of Sargodha, Department of Statistics, Pakistan | STATISTICAL MODELING FOR INDUSTRIAL PROCESS CONTROL |

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| 22.12.2025 | HALL-9/SESSION-1 |
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**CHAIR:** Dr Hélène ROBERT

| Author(s) | Affiliation | Title |
|---|---|---|
| Dr Marie Dupont | Sorbonne Université – Department of Physics, France | APPLICATIONS OF NANOMATERIALS IN QUANTUM OPTICS |
| MsC Julien MARTIN | Université Paris-Saclay – Computer Engineering Department France | DEEP LEARNING BASED IMAGE CLASSIFICATION METHODS |
| Dr Claire LEFEBVRE<br>MsC Antoine ROUSSEAU | Université de Lyon – Environmental Sciences Department France | AIR QUALITY MODELING IN URBAN AREAS |
| Sophie MOREAU | Independent Researcher France | BEHAVIORAL ANALYSIS USING SOCIAL MEDIA DATA |
| Dr Thomas GIRARD<br>Luc BERNARD<br>MsC Émilie FAURE | Université de Bordeaux – Mechanical Engineering Department France | ENERGY EFFICIENCY IN SMART MANUFACTURING SYSTEMS |
| MsC Nicolas PETIT | Université Grenoble Alpes – Materials Science Department France | MECHANICAL STRENGTH ANALYSIS OF COMPOSITE MATERIALS |
| Dr Isabelle LAMBERT<br>Dr Paul RENAUD | Université de Strasbourg – Biotechnology Department France | GENE EXPRESSION DYNAMICS IN CELL CULTURES |
| Camille DURAND | École Polytechnique – Department of Mathematics France | TOPOLOGICAL MEASUREMENTS IN COMPLEX NETWORKS |
| Dr François MICHEL<br>MsC Laura CHEVALIER<br>Julien PERRIN<br>MsC Anne COLIN<br>Marc BLANC | Université de Lille – Electrical and Electronics Engineering France | DATA SECURITY IN NEXT GENERATION SENSOR NETWORKS |
| Dr Hélène ROBERT | Université de Montpellier – Health Sciences Department France | EFFECTIVENESS OF DIGITAL HEALTH APPLICATIONS IN PATIENT MONITORING |
| Marie DUPONT | Sorbonne Université – Department of Physics France | APPLICATIONS OF NANOMATERIALS IN QUANTUM OPTICS |

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# BROMELAIN AS A SELECTIVE CYTOTOXIC AGENT: A PRELIMINARY IN VITRO EVALUATION IN LUNG CELL MODELS

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## ÖZET

Bromelain, *Ananas comosus* bitkisinden elde edilen ve geniş bir biyolojik aktivite yelpazesi gösteren bir proteolitik enzimdir. Düşük sistemik toksisitesi ve yüksek biyouyumluluğu, onu farmasötik uygulamalar için umut vadeden bir aday haline getirmektedir. Son çalışmalar, anti-enflamatuar, immünomodülatör, antitrombotik ve antikanser özelliklerini vurgulayarak kanser tedavisinde potansiyel kullanımını önermektedir. Bu çalışma, bromelainin seçici sitotoksik potansiyelini, akciğer kanseri (A549) ve normal bronşiyal epitel (BEAS-2B) hücreleri üzerindeki etkilerini *in vitro* olarak karşılaştırarak değerlendirmeyi ve aday bir antikanser ajanı olarak terapötik önemini ve güvenlik profilini açıklamayı amaçlamıştır. Hücreler, 48 saat boyunca çeşitli bromelain konsantrasyonlarıyla (0, 9.76, 19.53, 39.06, 78.125, 156.25, 312.5 ve 625.0 µg/mL) muamele edilmiştir. Hücre canlılığı MTT testi kullanılarak değerlendirilirken, morfolojik değişiklikler kristal viyole boyama ile incelenmiştir. Ayrıca, apoptotik ve nekrotik hücre ölümü mekanizmaları akım sitometrisi kullanılarak analiz edilmiştir. Bromelain, A549 hücrelerinde doza bağımlı sitotoksik bir etki gösterirken, BEAS-2B hücreleri özellikle daha yüksek konsantrasyonlarda daha düşük duyarlılık sergiledi. Kristal viyole boyama, hücre hasarıyla tutarlı morfolojik özellikler ortaya koyarken, akım sitometrik analizi, esas olarak erken apoptotik aşamadan geç apoptotik aşamaya doğru ilerlemeyle, güçlü, doza bağımlı bir apoptoz indüksiyonunu doğruladı. Bu bulgular, bromelainin normal hücreler üzerinde sınırlı toksisite gösterirken akciğer kanseri hücrelerini seçici olarak hedeflediğini ve akciğer kanseri tedavisinde güvenli bir yardımcı madde olarak potansiyel rolünü desteklediğini göstermektedir.

**Anahtar Kelimeler:** A549, BEAS-2B, Bromelain, Kristal viyole, Akım sitometrisi.

## ABSTRACT

Bromelain is a proteolytic enzyme derived from *Ananas comosus* that has shown a wide range of biological activities. Its low systemic toxicity and high biocompatibility make it a promising candidate for pharmaceutical applications. Recent studies have highlighted its anti-inflammatory, immunomodulatory, anti-thrombotic, and anticancer properties, suggesting its potential use in cancer treatment. This study aimed to assess the selective cytotoxic potential of bromelain by comparing its effects on lung cancer (A549) and normal bronchial epithelial

(BEAS-2B) cells in vitro, to clarify its therapeutic relevance and safety profile as a candidate anticancer agent. Cells were treated with various concentrations of bromelain (0, 9.76, 19.53, 39.06, 78.125, 156.25, 312.5, and 625.0 µg/mL) for 48 hours. Cell viability was assessed using the MTT assay, while morphological alterations were examined by crystal violet staining. Moreover, apoptotic and necrotic cell death mechanisms were analysed using flow cytometry. Additionally, apoptosis/necrosis cell death processes were also examined using flow cytometry. Bromelain showed a dose-dependent cytotoxic effect on A549 cells, which were less sensitive than BEAS-2 B cells, especially at higher doses. Crystal violet staining showed characteristic cell damage patterns, which were further supported by flow cytometry, indicating a very high dose-dependent induction of apoptosis, primarily through a transition from early to late apoptosis. It may be concluded that bromelain could be a selective anticancer compound for lung cancer, which has very low cytotoxicity even at higher doses.

**Keywords:** A549, BEAS-2B, Bromelain, Crystal violet, Flow cytometry.

## INTRODUCTION

Bromelain, an enzyme mixture of proteolytic nature from the pineapple plant (Ananas comosus) core and fruit, has recently attracted significant interest for its wide therapeutic applications (Pavan et al., 2012). Many in vitro and in vivo studies have already demonstrated its potency across various biological processes and have proposed its therapeutic value in treating certain diseases (Chobotova et al., 2010). Recent studies have focused on its anti-inflammatory, immunomodulatory, anti-thrombotic, and anti-cancerous properties and have displayed its therapeutic potency in integrative oncology (Pavan et al., 2012; Bajoria et al., 2025). However, its non-toxicity and biocompatibility render it feasible for use in oral and parenteral forms (Maurer, 2001). Current evidence also shows its ability to interact with tumour growth and metastasis by modulating vital cellular processes such as apoptosis, cell cycle regulation, and cytokine expression (Sukumaran et al., 2020). Additionally, its viability upon entrapment in poly(vinyl alcohol)/hydroxyethyl cellulose (PVA/HEC) nanofibrous matrix has been validated, retaining its enzyme integrity and inducing conspicuous cytotoxic effects upon in vitro evaluation of its admissibility and legitimacy with advanced drug delivery systems and cancer therapies (Balakrishnan et al., 2025). Moreover, its feasibility has been validated for increasing drug absorption and reducing undesirable chemical reactions during chemotherapeutic treatment regimens, making it an invaluable adjunct in cancer therapy (Chobotova et al., 2010). Importantly, its selective cellular toxicity has been documented to cause negligible damage to healthy cells and inducecytotoxic effects on malignant cells. Presently, considerable interest has been generated regarding its applicability and potential for valorization as a relatively safe complement to conventional cancer chemotherapeutic agents (Martinez-Benavidez & Vergara-Pineda, 2025). Despite its well-established applicability and utility as a digestive enzyme, research into its various therapeutic mechanisms, including apoptosis induction, cell cycle

arrest, and regulation of pro-inflammatory cytokines, has been intensively pursued in the context of solid tumours.

Owing to its promising properties, bromelain continues to appear on the radar as a multifunctional bioactive compound with significant implications for cancer treatment. This research focused on a research investigation into the influence of bromelain on cancer cell lines in vitro to better understand the therapeutic potential of the bioactive compound. To fulfill the research objectives of the investigation, the potential cytotoxicity of bromelain on lung cancer cells (A549) was assessed relative to its effects on normal human bronchial epithelial cells (BEAS-2B).

## MATERIAL AND METHODS

### Chemicals and Cell Cultures

A549 (human lung carcinoma) (Cat. No. CCL-185 ATCC®) and BEAS-2B (human bronchial epithelium) (Cat No. CRL-3588 ATCC®), cell lines were obtained from the Eastern Anatolia High Technology Research and Application Center (DAYTAM) (Atatürk University, Erzurum, Turkey). Bromelain was purchased from Orzax Ocean firm (TURKEY). All other chemicals used for the study werre obtained from Sigma-Aldrich, Inc. (St. Louis, MO, USA).

### Cell Viability Assay (MTT)

A549 and BEAS-2B cells were cultured under standard conditions. A549 cells were maintained in high-glucose DMEM, and BEAS-2B cells in DMEM/F12 medium, both supplemented with 10% fetal bovine serum (FBS), 100 IU/mL penicillin, and 100 µg/mL streptomycin. The cells were incubated at 37 °C in a humidified atmosphere containing 5% $CO_2$. Each cell line was seeded in 96-well plates at a density of $1 \times 10^4$ cells per well in 150 µL of medium and allowed to adhere for 24 hours. After incubation, cells were treated with bromelain at concentrations of 0, 9.76, 19.53, 39.06, 78.125, 156.25, 312.5, and 625.0 µg/mL for 48 hours. A 5% dimethyl sulfoxide (DMSO) solution was used as a positive control. Following the treatment period, cell viability was assessed using the MTT assay (3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide). 20 µL of MTT solution (5 mg/mL in phosphate-buffered saline, PBS) was added to each well, and the plate was incubated for 4 hours. Formazan crystals were dissolved by adding 150 µL of DMSO to each well. Absorbance was measured at 570 nm using a microplate reader. All experiments were performed in triplicate, and cell viability was expressed as a percentage relative to untreated control cells.

### Morphological Assessment

Morphological alterations caused by bromelain treatment were assessed by crystal violet staining. Cells were treated with bromelain at various concentrations for 48 hours, after which they were carefully washed twice with PBS to remove the medium and to loosen non-adherent cells. Remaining adherent cells were fixed by adding cold methanol for 10 minutes. Cells were fixed and stained with 0.5% crystal violet for 15 minutes. Excess dye was removed by carefully

rinsing the wells with distilled water, allowing the plates to air dry. Stained cells were visualised under an inverted light microscope (ZEISS AXIO SCOPE) at 100× magnification. Morphological features such as cell shrinkage, rounding, membrane blebbing, and detachment—indicative of cytotoxicity and cell death—were noted and compared between treated and control groups.

**Annexin V-FITC and PI analysis**

Quantitative determination of apoptotic and necrotic cell death caused by the effect of Bromelain in A549 and BEAS-2B cells was performed with Annexin V Apoptosis Detection Kit FITC following the manufacturer's protocol (FITC Annexin V Apoptosis Detection Kit with PI, BioLegend). After treatment, the cells were washed with PBS and 1X binding buffer by centrifugation at 1500 rpm. $1 \times 10^6$ cells were resuspended in 1 ml of 1X binding buffer. 5 µl of fluorochrome-conjugated Annexin V was added to each 100 µl of cell suspension, and the mixture was incubated for 15 minutes. After all cells were rewashed, 200 µl were resuspended in the same buffer, and 5 µl propidium iodide (PI) was added. Stained cells were diluted with binding buffer and analyzed with the Beckman Coulter CytoFLEX Flow Cytometer in DAYTAM. Fluorescence distribution was displayed as a two-color dot plot analysis, and the percentage of fluorescent cells in each quadrant was measured.

**Statistics**

The data are presented as mean ± standard error mean (SEM) from at least three independent experiments. The statistical analysis was performed using GraphPad Prism version 6.0 (GraphPad Software, La Jolla, California, USA). The differences among groups were compared using one-way analysis of variance (ANOVA) followed by Tukey's multiple-comparison test to assess statistical significance.

**RESULTS**

**Cytotoxic effect of Bromelain on A549 and BEAS-2B cells**

MTT assay results demonstrated a dose-dependent decrease in cell viability following bromelain treatment in both A549 and BEAS-2B cell lines (Figure 1). In A549 cells, a significant reduction in viability was observed at concentrations ≥78.125 µg/mL, indicating a pronounced cytotoxic effect. Conversely, BEAS-2B cells exhibited minimal cytotoxicity at lower concentrations, with a notable decrease in viability only at 312.5 and 625.0 µg/mL.

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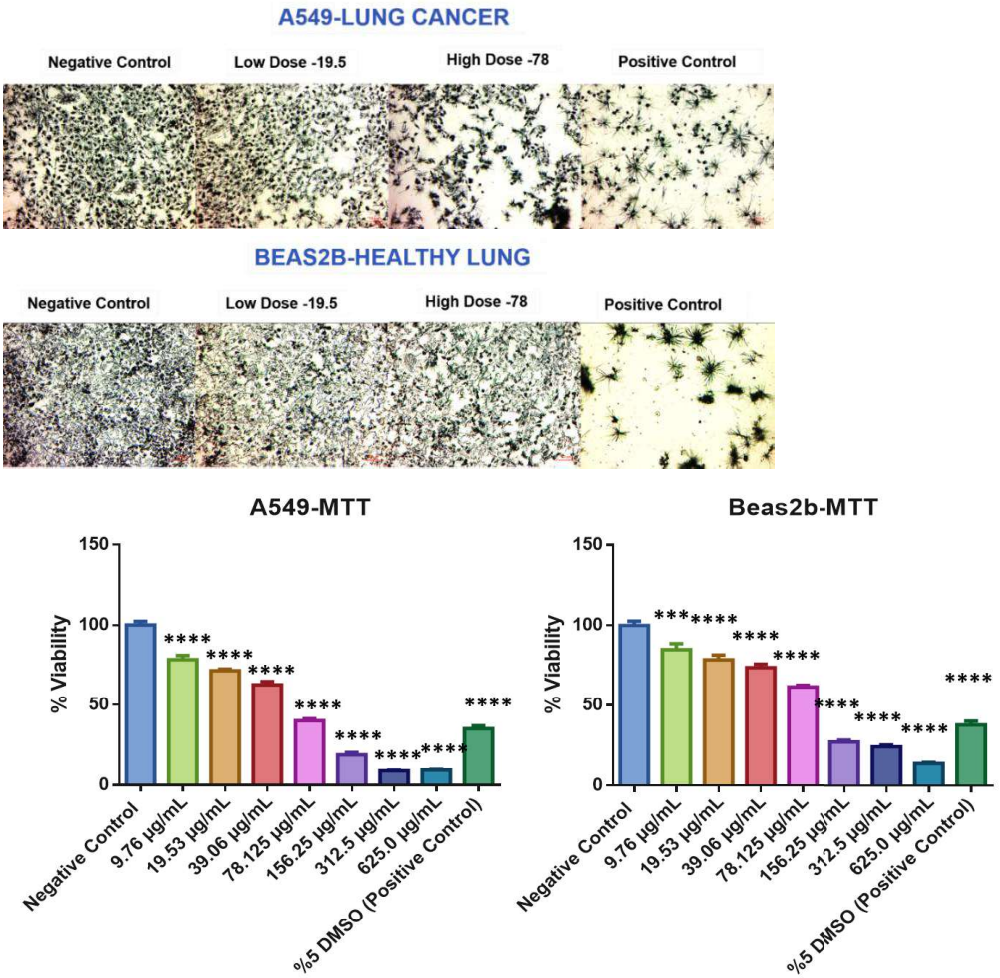



**Figure 1.** Representative microscopy images and MTT assay results of A549 and BEAS-2B treated with bromelain for 48 h. Scale bar = 50 µm. Data are expressed as percentage cell viability relative to the negative control. Error bars represent the standard error of the mean (SEM) from three independent experiments. Error bars correspond to the standard error of the mean of three repeated experiments. ** $p < 0.01$; *** $p < 0.001$; **** $p < 0.0001$ shows significant differences between the control and other studied groups.

Morphological evaluation using crystal violet staining (Figure 2) supported the MTT findings, showing dose-dependent structural alterations, including cell rounding, shrinkage, and detachment, particularly evident in A549 cells treated with higher bromelain concentrations. The concordant reduction in metabolic activity and clonogenic survival observed in A549 cells, but not in BEAS-2B cells, suggests that bromelain selectively targets lung cancer cells, possibly through differential regulation of mitochondrial function and cell adhesion mechanisms.

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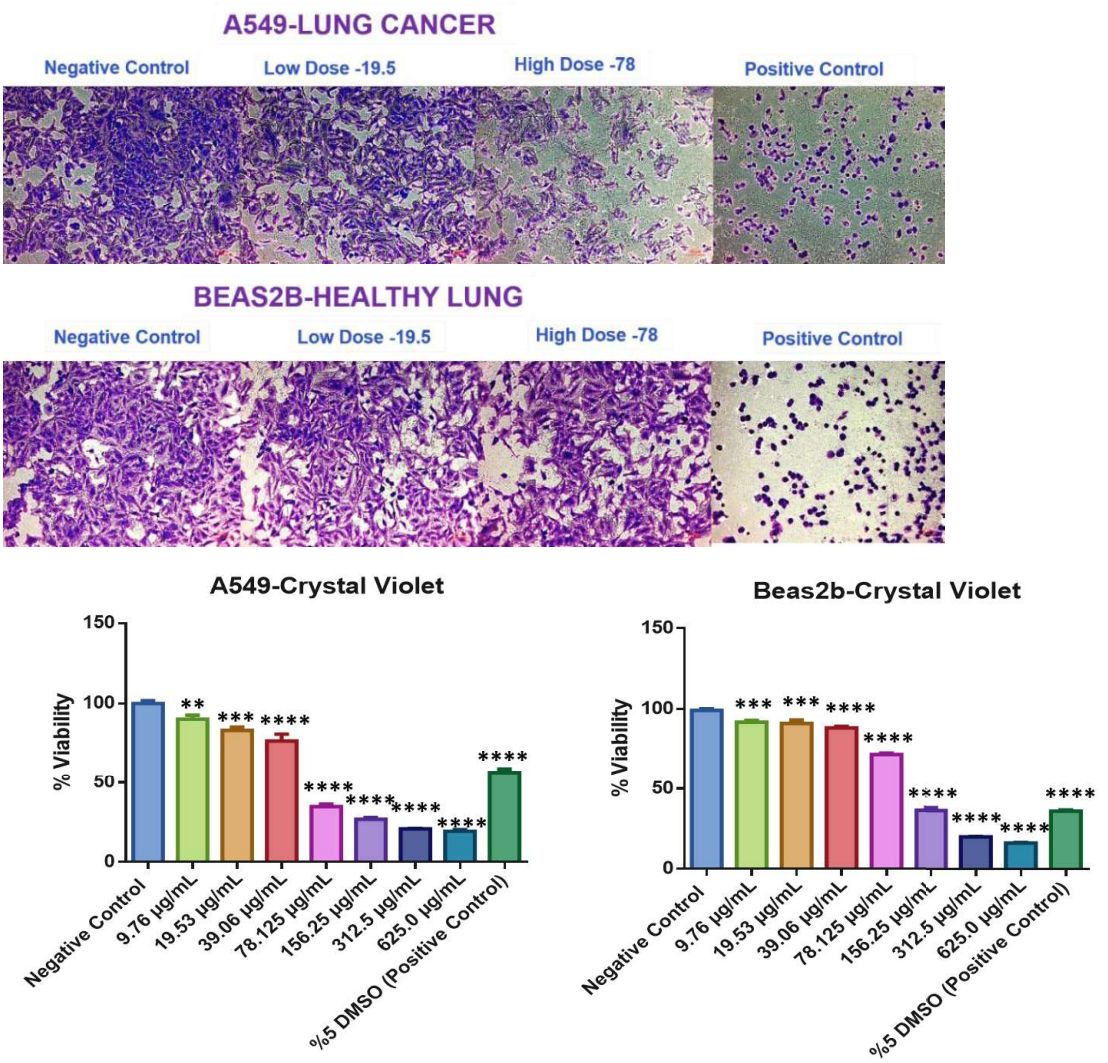



**Figure 2.** Morphological alterations and cell viability of A549 and BEAS-2B cells following bromelain treatment for 48 h (stained with crystal violet). Scale bar = 50 µm. Quantitative analysis of cell viability was performed using the crystal violet assay after 48 h of treatment with increasing concentrations of bromelain. Data are expressed as percentage cell viability relative to the negative control. Error bars correspond to the standard error of the mean of three repeated experiments. ** $p < 0.01$; *** $p < 0.001$; **** $p < 0.0001$ shows significant differences between the control and other studied groups.

**Determination of Bromelain-induced death types in A549 and BEAS-2B cells**

Flow cytometric charts of A549 and BEAS-2B cells exposed to 5% DMSO (positive control), 9.5 and 78.125 µg/mL Bromelain for 48 hours (Figures 4). In A549 cells, bromelain treatment induced a pronounced, dose-dependent apoptotic response, characterised by a progressive shift from early to late apoptotic stages rather than necrosis. The proportion of apoptotic cells increased substantially at higher bromelain concentrations, confirming activation of programmed cell death pathways. In contrast, BEAS-2B cells showed relative resistance to bromelain-induced apoptosis, particularly at lower concentrations, with only a modest increase in apoptotic fraction at the highest dose. These results collectively demonstrate that bromelain selectively triggers apoptosis in lung cancer cells while exerting minimal cytotoxic effects on normal bronchial epithelial cells.

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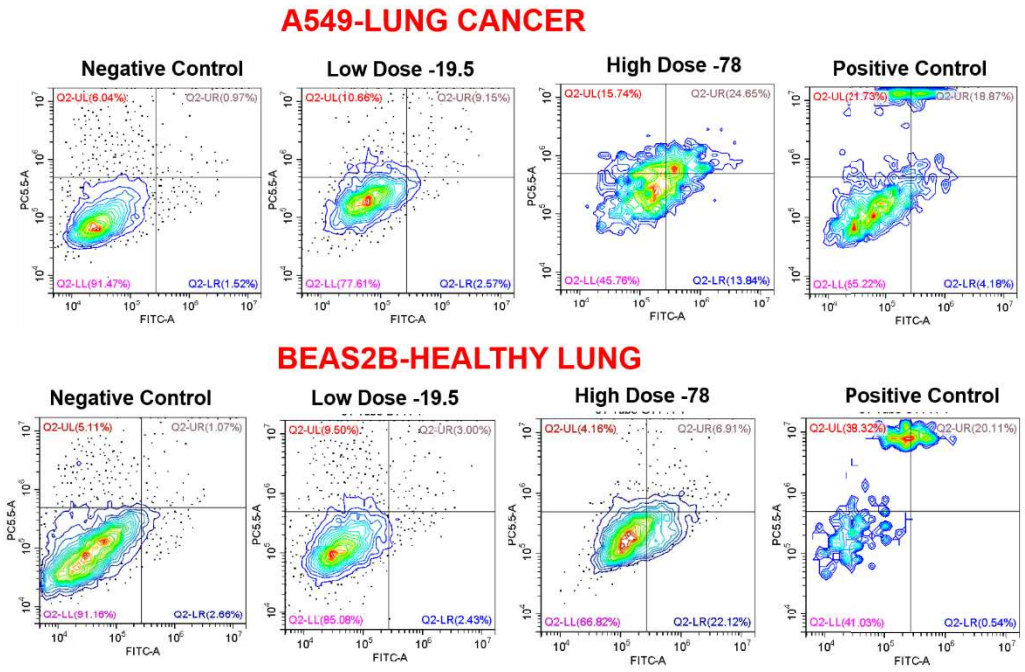



**Figure 3**. Flow cytometric analysis was performed to detect the proliferation of A549 and BEAS-2B following treatment with Bromelain for 48 h. A549 cancer cells: Rapid, dose-dependent induction of early and late apoptosis. Strong shift from live to apoptotic quadrants. BEAS-2B normal cells: Mild apoptosis, mainly at high dose. The majority of cells remain viable at therapeutic concentrations.

## DISCUSSION

The current study demonstrates that bromelain exhibits selective toxicity against human lung adenocarcinoma cells (A549) but not against normal bronchial epithelial cells (BEAS-2B). This result confirms previous confirmatory findings demonstrating bromelain's preference in treating cancer over normal cells (Chobotova et al., 2010; Bhui et al., 2009) and further confirms in several current studies showing that bromelain causes the generation of oxidative stress and mitochondrial damage in cancer cells of the lungs (Hossain et al., 2023; Bhatnagar et al., 2022).

Based on the flow cytometry analysis in this study, there is mechanistic proof of bromelain's pro-apoptotic rather than pro-necrotic activity against A549 cells, as indicated by a concentration-dependent increase in both early and late apoptotic events. The predominance of apoptosis suggests that bromelain exerts its pro-apoptotic action through programmed cell death rather than unprogrammed and ubiquitous membrane damage. Such pro-apoptotic activity of bromelain has already been confirmed in other cancer models, where it induced an intrinsic form of apoptosis characterized by mitochondrial depolarization, cytochrome c release, and activation of caspase-9 and caspase-3 (Raján et al., 2022; Tsai et al., 2023). The low level of necrosis further reinforces the notion that bromelain's pro-apoptotic activity is concentration-specific and specialized. More importantly, its poor ability to induce apoptosis in BEAS-2B cells at equal concentrations suggests a marked preference for target-cell selectivity, which

could be related to differences in cellular redox balance and metabolism between cancer and healthy cells.

Results from the MTT assay also confirmed a dose-dependent decrease in viability of A549 cells, confirming previous research on the inhibitory effects of bromelain on the proliferation of different cancer cell lines, such as breast cancer, colon cancer, and gastric cancer cells (Beccatini et al., 2021; Dhandayuthapani et al., 2011). The relative viability of BEAS-2B cells also reflects their relative resistance and potentially favorable therapeutic index. This has been described in prior literature citing minimal systemic toxicity and excellent biocompatibility (Maurer, 2001). A549 cells showed also significant alterations in cellular morphology associated to apoptotic/necrotic cell death (shrinkage, loss of adherence and rounding) by crystal violet staining. Similarly, cytopathic effects resulting from the treatment of PANOC1 cells with bromelain have been reported on other studies investigating its pro-apoptotic effect in pancreatic and colorectal carcinoma (Chakraborty et al., 2010). Morphological examination and crystal violet staining coincide with the results of MTT assay. The typical morphological characteristics were presented in bromelain-treated A549 cells such as smaller size, rounding change, membrane bubbling and cell detachment with concentration increase. These morphological alterations agreed with other reports that demonstrated apoptosis induced by bromelain in carcinoma models, based on cytoplasmic condensation loss of membrane integrity and the subsequent the fragmentation of cells (Bhui et al., 2009; Chobotova et al., 2010). In contrast, the BEAS-2B cells preserved their epithelial characteristics and only slight changes were evident when very high bromelain concentrations were used. This morphological integrity corroborates other reports (Maurer, 2001) that the compound is selective for tumour tissues maybe because of broad differences in cell and redox metabolism.

Because it has certain pharmacological properties, such as being more accessible orally, biocompatibility being relatively good and developments in the application of new drugs and so on, bromelain becomes a potential adjuvant for integrative therapies against cancer (Maurer, 2001; Singh et al., 2022). Its non-cytotoxic effect in BEAS-2B cells as well as on cell cycle distribution also verifies its selectivity, making it a potential drug adjuvant for cancer.

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**Conclusion**

In light of the conclusions drawn from this experiment and other recent studies in the literature, bromelain was found to exhibit vigorous cytotoxicity that is both concentration- and time-dependent in A549 lung cancer cells. However, it remains non-toxic to normal BEAS-2B cells. The cytotoxic effect of bromelain on cancer cells was manifested by inducing morphological changes, decreasing cell viability, and inhibiting cell cycle progression. Hence, bromelain remains a promising selective anticancer drug. However, further studies are needed to determine its function and role in cancer treatment.

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