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January 2023

From the Editor's

Dear Readers,

Greetings & Happy New Year 2023!!

In the January issue of our Newsletter, we received several popular articles from diverse fields. All the authors deserve great appreciation for sharing articles in huge numbers. Please continue sending articles to our Publication team and share published newsletter with your friends also.

I would like to thank the Editorial team including Print, Designer and Publication committee for their efforts throughout the edition.

Your suggestions are always welcome for improvement.

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A REPORT ON INTERNATIONAL CONFERENCE NTSD AT GOA UNIVERSITY, GOA NOV. 30th TO 2nd DEC. 2022

The International conference on "Natural Science and Green Technologies for Sustainable Development" was organized by NESA, New Delhi and School of Biological Sciences and Biotechnology Goa University, Taleigao Plateau Goa from November 30th to 2 Dec. 2022.

The sponsors play a pivotal role in organization of any conference, hence this conference was sponsored by Goa State Innovation Council, Royal Society of Chemistry, Indo-German Science and Technology Centre, Indo-French Centre for the Promotion of Advanced Research, Eurofins, Genomics and Aquario Lifesciences.

The conference organized with the theme "Natural Science and Green Technologies for Sustainable Development" to bring various academician/researchers/students/scientists under one roof to discuss needs of current scenario to mitigate the global warming and pollution problem by interlinking the sustainable development goals (17 SDGs) of UNEP. (MEA and SDGs).

"NTSD 2022", was inaugurated on 30th November at Chemistry Auditorium, Goa University, Goa. The Opening Ceremony was presided by Vice Chancellor Prof. Harilal B. Menon, Goa University while Shri. Damodar Mauzo, was the chief guest. He is a Goan short story writer, novelist, critic and script writer in Konkani. He was awarded the prestigious Jnanpith Award in 2021, Sahitya Akademi Award in 1983 for his novel Karmelin and Konkani Sahitya Puraskar award for his novel Tsunami Simon in 2011. Prof. Javed Ahmad, President NESA, Prof. Savita Kerkar, Convenor, Prof. Shakeel Ahmad Khan Organizing Secretary of the conference and General Secretary of NESA and Shri R. K Sinha, Exe. Secretary NESA welcomed the guests and opened the conference by lighting the lamp of knowledge. Prof. Savita Kerkar, Convenor of conference has delivered the welcome address. Prof. Javed Ahmad had given the introduction of NESA, New Delhi. It is further followed by the address of the Chief Guest and Vice Chancellor. The Chief Guest, Vice Chancellor and

dignitaries on Dias have released the abstract book of the conference. The Chief Guest and Vice Chancellor honoured the Annual awardee of NESA 2022.

The Prof. T. R. C. Sinha Lifetime Achievement Award was given to Prof. Harilal B. Menon, VC of Goa University.

Kanak Sinha Memorial award was given to Prof. Savita Kerker, Dean, School of Biological Sciences and Biotechnology Goa University.

The three honorary fellow awards were given to

1. **Shri Jose Manuel Noronha**
2. **Dr. PA Lokabhartahi and**
3. **Dr. Sanjeev Ghadi**

In a total of 6 technical sessions, the conference covered more than 68 lectures including 10 Keynote Lecture, 12 invited lectures, 37 oral presentations, and 47 poster presentation, where 10 best presented by the scholars were selected for best poster and best oral presentation.

Technical Session I

The first technical session was chaired by Prof Savita Kerker, Dean of School of Biological Sciences and Biotechnology, Goa University and co-chaired by Prof. Mrutyunjay Suar, CEO, KIIT-TIB, Bhubaneswar. The rapporteur was Dr. Siddhi Jalmi, Assistant Professor, School of Biological Sciences and Biotechnology. In this session we had two keynote speakers. The first keynote talk was given by hon Vice Chancellor of Goa University Prof Harilal B Menon on the topic entitled "Green technology". He discussed about different components aerosols and their role in climate change. He focused on effect of aerosol on overall heating of our planet by decreasing the albedo. In his talk Prof Menon also showed a way forward for sustainable development through the use of green technology in the form of phytoplanktons in the oceans.

The second keynote speaker was Dr. Thambanel Meloth, Director of NCPOR, Goa. Dr. Meloth talked on Polar regions in a warming world giving glimpse about importance of polar region maintaining earth's climate and impact of global warming on polar region. Sir also shed light on disaster in Chamoli and effect of global warming on Himalayan fauna.

Technical Session II

The second technical session was chaired by Dr. Pankaj Kumar Shrivastava, co-chaired by Prof. S. Krishnan and Rapporteur was Dr. Rupali Bhandari.

The first keynote speaker was Dr. Mrityunjay Suar, who spoke on the topic the paradigm of molecular Ecomanotechnology for biocompatibility using Zebrafish and Paramecium as model organisms. He highlighted the morphological, physiological and biochemical alteration in both these organisms due to exposure of nanoparticles.

The second keynote speaker was Dr. Chinmay Sarangi, who spoke on Hydrometallurgical processing of industrial solutions and effluents for value addition. He enlighten us with various technologies of nickel metal extraction from

copper refinery effluents, electrolytic denitrification technology, electrochemical splitting of sodium sulphate and aluminium improvement.

The invited speaker Dr. Vishaka Raina delivered lecture on "Bacterial Diversity driven macrophyte invasiveness in a brackish water". She spoke on the effect of supercyclone and climate change on microbial diversity in Chilika lake. Also she spoke on the invasion of macrophyte Phragmites Karka after the cyclone and salinity is the major factor for the growth of this weed.

Second invited lecture was given by Dr. Kuldip Jana, who spoke on Natural aryl hydrocarbon receptor antagonist resveratrol ameliorates environmental toxicants. He highlighted the effect of environmental toxicity on male infertility.

ORAL PRESENTATION

THEME: BIOTECHNOLOGY AND ENVIRONMENT

This session was chaired by Dr. and co-chaired by Dr. Shanti N. Dessai, School of Biological Sciences and Biotechnology, Goa University and Eleven research papers were presented for this session as follows,

Shribash Roy (Title) Elevated CO₂ effects DNA Methylation pattern of low and high elevation populations of Arabidopsis thaliana,

Shravani Korgaonkar

Mitigating effects of drought by foliar application of salicylic acid on rice cultivars: a comparative study

Sajani Singharoy

Preliminary analysis of the anti-diabetic and anti-oxidative effects of hydroethanolic (3:2) bauhinia acuminata bark extract: an in vitro investigation.

Sukriti Hazra

Hypo-testicular activity of the seed of areca catechu (linn) in albino rat: effective fraction selection study

Shibani Das

Anti-diabetic and anti-oxidative efficacy of hydro-methanol (60:40) extract of aerial parts of commelina benghalensis linn. In streptozotocin induced diabetic male albino rat : an in-vitro approach

Tanushree Mondal

Hypo-testicular activity assessment of hydro-methanol (60:40) seed extract of luffa acutangula in human and albino rat: an in-vitro investigation

Pampa Lohar

In-vitro study of anti-spermatogenic activity of hydro-methanol extract of (60:40) caesalpinia pulcherrima leaves on human and rat sperm

Sachin Gajendra

Extraction of lipid from microalgae

Dr. Trelita D'Souza

Green synthesis of silver nanoparticles mediated by garcinia indica (kokum) and their effectiveness against acne-causing bacteria

Dr. Marielou Ferrao

Biodiversity Studies Of Pigmented Bacteria And Fungi Isolated From Panjim Nallah Water And Characterisation Of Selected Isolates

Kandeep Gurunathan

Development of biodegradable Nanocomposite packaging material for chicken meat

Each presenter was given 7 minutes for their presentation followed by a Q&A session for 2 minutes. All the presenters made their attempt to answer the questions that were raised by the audience. The session ended with thanks to the chair and co-chair and also by giving certificates and mementos to them.

Technical Session III

The technical Session III on day 2 was chaired by Prof. Sanjeev Ghadi, SBSB, Goa University and Co-chaired by Dr. Deepak Kumar, Sr. Scientist, IARI Hazaribagh and Rapporteur Dr. Shamshad Shaikh, Assistant professor, Goa University. The session started at 10.00 a.m. and the first speaker was Dr. Shrikant Mutnuri Professor, Dept of Biological sciences BITS Goa. He spoke on a decentralized waste water treatment system for sustainable development, wherein he mentioned about the demonstrations made by him and his team like single household vertical wetland-based domestic wastewater treatment and single household empowered septic tank for domestic wastewater treatment focusing on wastewater sanitization.

The second speaker Prof. Suman Kundu, Director, BITS, Goa highlighted about the shape and pain caused in the veins of individuals suffering from sickle cell anemia. He briefed about the approaches made to prevent sickle cell disease (SCD) like using modulators, inducing fetal hemoglobin, hydrating sickle red blood cells, and preventing oxidative damage. He spoke about the herbal touch a green initiative initiated by him and his students to prevent SCD by trying different formulations and combinations of plant parts. He spoke about the formulation Hbs-sailin extracted from seed, leaves and fruits of different plants which showed the antisickling of sickle cells. This formulation was found by them to be nontoxic when tried on rats and mice. The human trials in Nigeria and south Africa showed that the crises, blood transfusion and hospitalization were reduced in SCD patients.

The third speaker Dr. Dhavel Patel, Head of Research and development, Latembarcem Breweries, Pvt. Ltd, Goa spoke on using spent grains from brewery to generate potent biofertilizers. He explained that the fungi *Talaromyces pinophilus* spores if placed in spent grains take less time to make biofertilizer as it uses cellulose present in the waste to grow and proliferate confirming *Talaromyces* sp. to be potent to generate biofertilizers.

The fourth speaker Dr. P.V Lalitha, Chief Scientific Officer, IGSTC, New Delhi, spoke about the mission and vision of IGSTC, and the different projects fellowships, grants, and workshops supported by IGSTC to help the researchers to carry out collaborative research work between India and

Germany. Wherein, the students will avail the opportunities to work in both Indian and German laboratories for some time. She mentioned about the different funding schemes provided by IGSTC that include WiSER, 2+2 projects, Bilateral workshops, Industrial fellowships, PECFAR and SING encouraging the researchers to take benefit of the same.

All the Keynote and invited talks were followed by Questions & answers and Discussion. The session ended by thanking the chairs.

Technical Session IV**1. Dr. Ateet Dutt:**

Synthesis of Zinc oxide nanorods and nanowires for their application in Biosensors, Gas sensors, Hydrogen gas production, solar cells and antibacterial/Antibacterial coating preparations.

- Biosensors: Optical and piezoelectric ZnO based biosensor development for cancer and virus detection. Self-assembled monolayer for E.coli detection.
- Hydrogen gas production: Photocatalytic hydrogen production
- Gas sensors: Nanowires/nano structures for detection of CO₂.

2. Dr. Mukesh Dubey:

Biocontrol of plant diseases using fungi *Clonostachys rosea* IK726. *Clonostachys rosea* IK726 can be applied as biocontrol agent against plant pathogen *Fusarium* (foot rot and head blight) and *R. solani*.

Isolated 120 strains of *Clonostachys rosea* IK726 across India and done whole genome sequencing. Done Polyketide synthase (PKS) gene knockout studies and compared with wide type and concluded that mutant have less biocontrol activities. Later identified 4 novel metabolites involved in biocontrol.

3. Dr. Neel Sarovar Bhavesh:

Based on different Prakritis (6 types) as mentioned in Ayurveda they collected samples (urine, saliva, blood, sweat) from over 294 patients during Uttarayan and Dakshinayan and compared metabolites using OMICS technology. Various techniques such as HPLC, GC, MS and NNM technologies were used to study metabolomics from people with different prakritis. He concluded that Identification of molecular markers according to prakritis using OMICS data will help for diagnosis and treatment of diseases.

4. Dr. Akhil Agarwal:

Using conventional oil recovery technologies you can only recover 30-35 percent oil recovery but 70 percent oil which is still to be recovered can be recovered by enhanced oil recovery methods. Development of Biochemically enhanced oil recovery. He explained how Biochemically enhanced oil recovery has advantages over conventional oil recovery methods, microbially enhanced oil recovery and chemically enhanced oil recovery.

Poster session on day 1, 27 participants had presented the posters and on second day 18 participants presented posters. The judges of 1st day were Dr Milind Naik, Dr. Chinmaya Kumar Sarangi, Dr. Pankaj Shrivastava and for the second day the judges were Prof Shakeel Ahmad, Dr Pankaj Shrivastava and Dr Milind Naik.

The participants scoring highest marks are as follows:

ON DAY ONE

- Theme: 1. AGRICULTURE AND ENVIRONMENT
- 2. AIR POLLUTION AND MITIGATION

7 papers were presented

Ms. Sonia Rathee presented paper entitled 'Hyptis suaveolens inhibits growth of co-occurring plant species through allelopathic interference'

Ms. Ashly Kurian presented paper entitled 'Carabid beetles (coleoptera: carabidae) in the rice agro-

ecosystem of kerala.' , to identify the beetles she has translated German identification keys to English.

Mr. Manish Kumar presented paper entitled 'Applying data envelopment analysis (dea) approach for energy input-output flow in wheat cultivation'

Mr. Tanveer Ahmad Khan presented 'Novel mechanistic insights on melatonin mediated physio-biochemical, microscopic, and histochemical modifications in tomato plants to promote salt stress tolerance.'

Ms. Aradhana K S presented 'Biomonitoring Of Indoor Air Contaminants Using Spider Web'

Dr. Vikash Yadav presented 'Rhythmic expression of lncRNAs and its function in floral development and the circadian clock'

Glimpses of Goa Conference







SPECIAL DAYS IN JANUARY 2023

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5 January: National Birds Day

National Bird Day is observed on January 5 in order to increase public understanding of the importance of tiny tweeting to the ecosystem. This programme is supported by the Avian Welfare Coalition, an organisation that works hard to raise public awareness of birds who are abducted or created in captivity for either monetary benefit or for human enjoyment.



11 January: Death anniversary of Lal Bahadur Shastri



He served as India's second prime minister after independence. He made the phrase "Jai Jawan Jai Kisan" well-known. He actively took part in India's war for independence. On January 11, 1966, he passed away from a heart arrest. He was also referred to internationally as the "Man of Peace."

11 January: National Human Trafficking Awareness Day

It is marked on January 11 in order to raise awareness of the ongoing problem of human trafficking. The purpose of this day is to promote and defend the rights of victims of human trafficking as well as to increase awareness of their condition.



12 January: National Youth Day



Every year on January 12, Swami Vivekananda Jayanti, commonly known as his birth anniversary, is observed. He was conceived on January 12, 1863.

14 January: Lohri Festival

The harvest season officially begins on Lohri, the first festival of 2023. In northern India, particularly in the states of

Punjab and Haryana, it is celebrated with fervour. On January 13 or 14, 2023, a bonfire will be lit to commemorate the Lohri festival, and people will dance around it with

friends and family. The attendees at the campfire offer corn, rice, rewri, jaggery, and wheat stem.



15 January: Makar Sankranti

It will be observed on

January 14 this year and signifies the end of the winter season and the start of the new harvest season.



15 January: Pongal

Pongal, one of India's most well-known holidays, is widely

observed by the Tamil population all over the world. The Tamil solar calendar places the celebration of Pongal in the Tai month.



23 January: Netaji Subhas Chandra Bose Jayanti

On January 23, 1897, Netaji Subhash Chandra Bose was born in Cuttack, Orissa. One of the most well-known Indian freedom warriors, he was. Azad Hind Fauj or the Indian National Army (INA) were the names of his soldiers. During World War II, he also served as the commander of an overseas Indian national force fighting the Western forces.

26 January: Republic Day

The Government of India Act of 1935 was repealed by the Indian Constituent Assembly on November 26, 1949, and the Constitution became the



ultimate law of the land. On January 26, 1950, a democratic form of government was implemented. The grandest parade that was held on Rajpath in Delhi annually took place on this day.

ENROLL YOURSELF TO NESA NEWSLETTER EDITORIAL BOARD MEMBER

Editorial board members of NESA newsletter will be revised for the year 2023. All the interested applicants may send their curriculum vitae to **Editor in Chief** by **15th May 2023**.

SOFTWARE AS A MEDICAL DEVICE: HEALTHCARE GETS SMARTER!

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Software as a medical device (SaMD), a term referred to a software with a medical purpose that is capable of functioning in an effective manner without the need of being a part of a hardware medical device. It is also referred to as standalone medical software. Software has gained huge popularity in our day-to-day activities and is rapidly evolving through continuous innovations as per the requirement. In addition, the realization of the importance of online/virtual platforms amid the novel coronavirus pandemic situation has further strengthened the call for software as a medical device (SaMD) technology to boom today and in the upcoming years. Everyone in the present tech era comes across the utilization of softwares that assist in making our lives easier to function, even if in our home environment. Starting from MS windows to surfing the internet, playing games from the cloud, or software that helps in the assessment of our health parameters, all are examples of software. However, there is a slight distinction between different softwares available. Some software requires hardware to carry out its function (software integral to a device or software used for manufacturing or maintenance of a device), while some function even without the need of the utilization of hardware. Such software, themselves serve as a device too. In the case of software as a medical device (SaMD), the standalone software capable of making well-informed clinical decisions unlike other standalone software without a medical purpose is gaining momentum with advancements in healthcare technology. The use of software in healthcare is further attributed to the multiple tech platforms that consist of personal computers, smartphones, and network servers. Additionally, with growing access and penetration of internet and cloud platforms, software for making clinical decisions is becoming doctors' or medical/biomedical professionals' best friends with time.



Software as a medical device includes an in-vitro medical device in the form of software that is capable of examining fluid or body tissue samples in a laboratory environment for providing information related to diagnostic, monitoring, or compatibility motives. Additionally, SaMD holds suitability to run on a general-purpose non-medical computing platform without being its integral part for the achievement of an intended medical purpose. Furthermore, a SaMD can be utilized in conjunction with other products that include medical devices and may interface with other medical devices that include other SaMDs, hardware medical/general-purpose devices, and general-purpose software. Mobile apps capable of performing functions with a medical purpose are also listed under the definition of software as a medical device. However, software with an intended motive to drive a hardware medical device is not considered a SaMD. The need for smart technologies (like artificial intelligence, augmented reality, cloud computing, etc.) in the field of healthcare requiring minimum human

interaction is serving as a strong driver for software as a medical device to sustain. This need is further supported by the requirement of software in medical devices for performing the following functions namely, monitoring, assistance in interoperability, for making efficient preventative practices, for smooth remote diagnosis, and

for ensuring data accuracy and consistency. The medical purpose served by a SaMD involves diagnosis, treatment, monitoring, disease alleviation, investigation, modification, replacement, or supporting the anatomy or a physiological process, to help in life support or sustenance, conception control, and disinfecting medical devices.

Harmonization

For a technology to be well accepted among a range of consumers depends on how well it is being regulated along with the harmonization of regulations. Harmonization of regulations refers to a process of creation of the common standards throughout the internal market. Harmonization leads to the creation of consistency of laws, standards, practices, and regulations in order to smoothen the functioning of businesses across varied geographical boundaries. Also, through harmonization, it is taken care that businesses of one state do not attain an unnecessary economic advantage over other businesses due to different

rules. Furthermore, harmonization leads to the reduction of compliance and regulatory burdens for business operations at the local or international level. In spite of the fact that harmonization aids in the establishment of the admitted levels of unification of laws at the international level, this, however, does not necessarily mean achieving the vision of complete uniformity. Realizing the distinct features of the software as a medical device (SaMD) that stretches beyond the conventional medical device, it has been observed that regulators at the global level have recognized the requirement of converging on a common regulatory framework. This has further enabled all the stakeholders involving regulators for promoting safe innovation along with the protection of patient safety. The International Medical Device Regulators Forum, abbreviated as IMDRF, a medical device regulators group around the globe, volunteered for reaching harmonization on medical device regulation. The forum is responsible for the development of combined agreed-upon documents at the global level for topics related to medical devices. IMDRF, in 2013, formed a group, software as a medical device working group (WG) for the development of guidance motivating innovation and well-timed access to the safe and effective SaMD internationally. Under the control of the FDA, i.e., U.S. Food and Drug Administration, the SaMD working group consented to certain parameters including key definitions, the framework for risk categorization, quality management system (QMS), and clinical evaluation for software as a medical device.

Healthcare 1.0 And Beyond

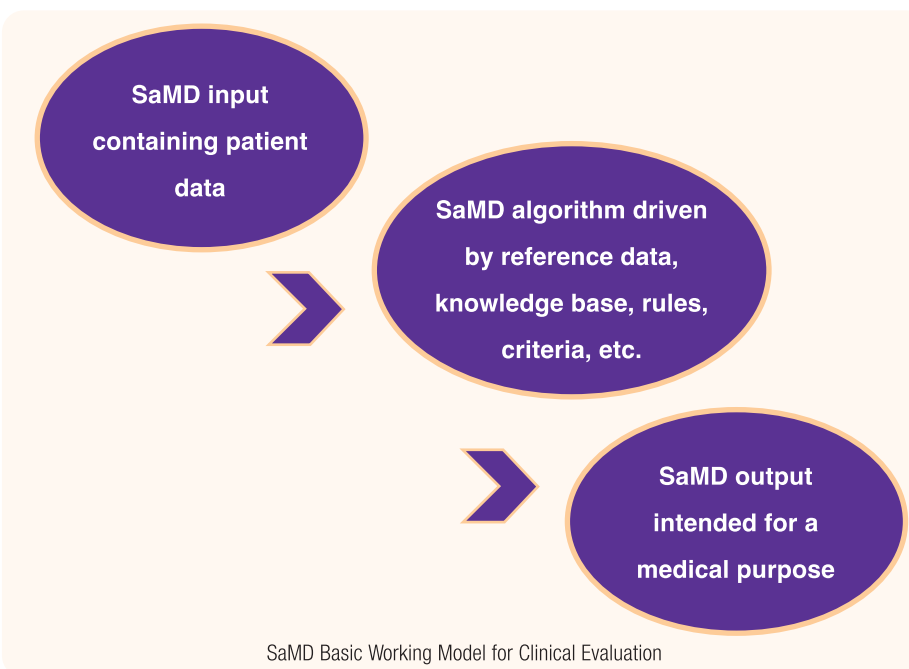
Healthcare has evolved with the way a patient is being treated along with the utilization of healthcare systems. The working of a healthcare system slowly evolved from a method where a healthcare system included loads of documentation on papers to the adoption of a digitized way of patient care. SaMD is enabling the healthcare 3.0 and healthcare 4.0 revolution that is an amalgamation of human and technology. This has further led to entering the era of the internet of things (IoT) that include the internet of medical things (IoMT) for the management of smart

healthcare systems and services and aim to satisfy human quest regarding their improvement in health status. With growing health awareness among individuals worldwide along with technological advancements in healthcare, people hope that the current healthcare system will definitely cure their chronic diseases. Hence, SaMD fits well in the fulfilment of the criteria where smart and intelligent systems with technologies like artificial intelligence (AI) are capable of making predictive analyses of the severity of a patient’s health condition. Thus, providing preventive measures before the disease turns severe.

Furthermore, with remote healthcare in vogue, patients through health apps are capable of being well-connected to their doctors for receiving effective treatment, thus strengthening the utilization of software as a medical device. The SaMD technology can hence prove to be of immense help as the mobile health industry continues to grow at a significant pace, and will keep on increasing. With the increase in mobile health apps, the USFDA is paying much more attention so that it is well utilized. There is a distinct difference between a health app and a wellness app. A wellness app is capable of keeping a track of the overall health of the user, on the other hand, a health app is basically a mobile software (created to be run on a mobile device) that holds the capability in diagnosing, tracking/monitoring, and treating disease. Hence, a health app falls under the category of software as a medical device that helps physicians or medical/biomedical professionals in making clinical decisions. As it has been observed that most of the health apps have a serious consequence on a patient’s health condition, FDA has taken the responsibility of the scrutinization and regulation of all these apps. The organization believes in adopting a well-balanced approach for all the mobile medical apps that aim to support continuous innovation, in addition to offering assurance of complete patient health protection.

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Source: Dream 2047, January 2023.



REPORT OF THE EVENT “YOUR ENVIRONMENT DEFINES YOU”

Shamama Javed

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She has completed her M. Pharm., Ph.D. (Pharmaceutics) from Jamia Hamdard, New Delhi, India and presently she is working as Assistant Professor in the Department of Pharmaceutics, College of Pharmacy, Jazan University, Kingdom of Saudi Arabia since 2018. She has a good teaching and research experience of 10 years in Pharmacy. She is also supervising Pharm.D students in undergraduate research work and till date she has published more than 40 research and review papers in high impact factor journals. She has 1 Indian patent to her credit with the title “A composition for the treatment of liver diseases” wherein, the invention relates to a herbal composition to increase the bioavailability of silymarin (a phytomolecule) with the use of natural bioenhancers.

She is a dynamic person who prefers to remain involved in various college and departmental activities and gives outstanding contribution towards her profession in pharmaceutical sciences. Presently, her research work involves novel formulation development and bio-availability enhancement of problematic pharmaceutical drugs and natural phytomolecules by Quality by Design approach under the leadership of Head, Department of Pharmaceutics, Dr. Yosif Almoshari who is also very keen and remains active in intriguing pharmaceutical research. The Department of Pharmaceutics is focused on contributing to pharmaceutical sciences through innovative ideas in research and development and all the other faculty members of the department have sharp professional acumen and are eminent researchers in their respective specializations. There is a good collaboration between the departments to carry out pharmacy-related research under the able guidance of Dean College of Pharmacy, Dr Abdulkarim Bin Mohammad Meraya.

Dr. Shamama Javed is a life member of National

Environmental Science Academy (NESA) since last 6 years (2017) and she clearly understands the role of a pharmacy in keeping environment clean and sustainable. Recently, she took initiative along with young female Pharm.D students and participated in student activity unit in collaboration with various departments of College of Pharmacy to celebrate the event “Your Environment Defines You” on 21st March 2023. The students group was enthusiastic and they aligned with the theme of the event to increase and enhance environmental awareness among society and individuals and stimulate new habits and behaviors that encourage environmental awareness. They all choose the topic and created awareness towards *Saudi Green Initiatives (SGI) and its Goals* through pamphlets, quotes, and informative charts on sustainability which is a societal goal that relates to the ability of people to safely co-exist on earth over a long time. It was analyzed that Saudi Arabia is playing a very important role in creating sustainable global future to improve quality of life and creating economic opportunities. The *Saudi Green Initiatives (SGI)* recently inaugurated in 2021, has diverse sustainability programs which addresses climate change. The Vision 2030 aims to achieve three main goals i.e. to reduce carbon emission by more than 278 MTPA, to plant 600+ million trees and to protect 30% of Saudi land and sea. As a researcher in pharmaceutical sciences, she along with her students also emphasized the role of pharmaceutical research towards sustainability as green pharmaceutical solvents are more sustainable, and environment friendly and can be considered as biosolvents as these are derived from natural products. These green solvents can be useful in drug discovery and development to reduce ecological burden often imposed by residues of active pharmaceutical ingredients on aquatic and terrestrial environment after the use by patients via water-wastes.

With this awareness session, the group was able to create interest towards environment in other students of the College of Pharmacy. The participating female Pharm.D students were proactive in taking initiatives and created environmental awareness through all print-media means. Miss Fatimah Khalid Shbair Najmi made the pamphlets on Green and Sustainable Pharmacy and educated the listeners on importance of use of green solvents in pharmaceutical research. Miss Lujain Mohamed Ali Akkam created a very vibrant and informative poster on the



Fig. 1: Pamphlets on Green and Sustainable Pharmacy.



Fig. 2: Informative pamphlets on Saudi Green Initiatives and its Goals.



Fig. 3: Green Riyadh as mega ambitious environmental project.



Fig. 4: The table decorated with quotes on paper rolls, charts and pamphlets as print-media to create and spread awareness in the audience.



Fig. 5: Painting depicting importance of tree plantation on the earth.

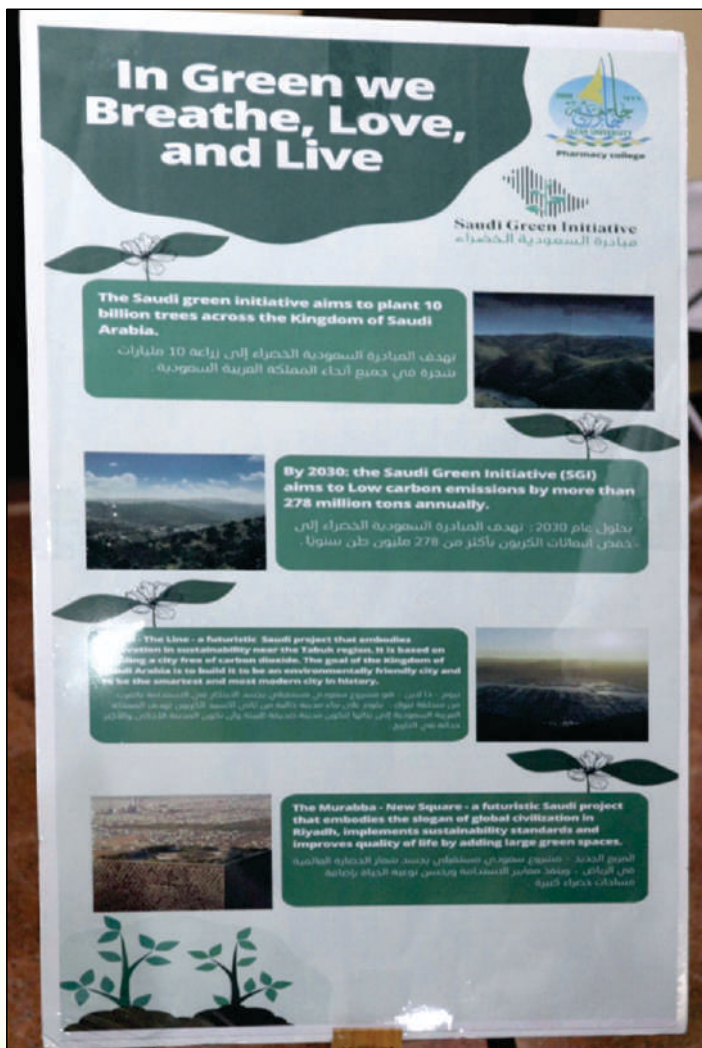


Fig 6: Poster showing Saudi Green Initiatives and its goals.

theme and named it “In Green we Breathe, Love, and Live” along with her companion and friend Miss Yara Hussain Mussa Alshaabi. Another student Miss Reema Mohammed Ahmed Hamadi made pamphlets highlighting the Saudi Green Initiatives and its goals and informed the listeners about the initiatives which Saudi Government is taking in keeping the environment green and clean for its citizens. The Saudi Arabia's innovative and sustainable projects such as NEOM city, Green Riyadh and other Red Sea projects were nicely explained by Miss Silwan Abdullah Hussain Joribi. A very beautiful and breath-taking painting was made by Miss Elham Bader Mansour Abutalib showcasing the earth and plantation of trees in it to keep it green and clean. In the last, Miss Revan Abubakr Ibrahim Maadi and Miss Layan Essa Radman Jarad made the session more interesting by taking a short in-person survey from the audience including students and faculty on questions related to their session and generated 50 responses. The audience and listeners seemed to have understood the concept and pledged in spreading the awareness further to their family, friends and society. The report of this event is incomplete without acknowledgements, so the effort of all the participating students is duly acknowledged here. Felt honored upon receiving this great opportunity and now feel privileged enough to extend heart-felt gratitude and special thanks to Vice Dean (Female), Dr. Marwa Qadri for giving her valuable time and presence throughout the event. Also, the support received from the respectful colleagues, Prof. Durga, Dr. Aamena, Dr. Yousra and Dr. Dalin and all administrative staff of the college is highly acknowledged.

PROTECTING VEGETABLES FROM ADVERSE WEATHER AND HARNESSING THEIR POTENTIAL

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Vegetables are rich sources of various health building substances and form an integral part of daily diet. Realizing the importance on human health, there is tremendous shift in vegetable consumption in India during the last decade. India ranks second in vegetable crops production in the world. However, the production can't fulfil the requirement if balanced diet is to be provided. It is estimated that total requirement will rise to 350 million tonnes by 2050. There are different ways and means to achieve this target, e.g., bringing additional area under vegetable crops, using hybrid seeds, use of improved agro-techniques and growing off season vegetable crops. To meet the need of ongoing demand, the growing of vegetables under protected environments the need of the hour. Certain factors, i.e., high rainfall, temperature stress, drought, shortage of irrigation facilities, non-availability of quality seeds are responsible for low yield.

The increase in return in protected cultivation has made through a greater effort of plant breeder in developing indigenous varieties and the extension of protected cultivation and breeders' work has been linked by a close relationship. The choice of crops and development of cultivars for protected cultivation is a fundamental variable that may significantly affect the success and economic return of the entire production process.

Choice of crops

High value low volume crops tomato, capsicum, cucumber and gherkin are suitable for growing under protected environment. The other high priced vegetables like bitter melon, muskmelon and summer squash which have demanding big cities off-season are suitable for protected cultivation.

Suitable varieties

In the protected environment the vertical space is mostly utilized, so the plant type should be indeterminate in nature. The crop undergo extreme low and high temperatures during different growth stages, the genotype should tolerate low and high temperature stress. There will be problems of nematodes and other soil borne diseases due to growing of similar crops in the same land year after year. Therefore, the variety should have resistance to these stresses. In polyhouses/greenhouses, fruit thinning is done for proper development of fruits. In some cases self pruned variety saves the labour.

In tomato indeterminate growth habit and single stemmed producing flowers and fruit continuously along the main stem are suitable for protected cultivation. These varieties reach to a length of 30-40 ft in a 10 month season, thus sustaining protected tomato cultivation over a long period. Capsicum or sweet pepper has prospect in protected environment. This crop is gaining popularity among small and marginal farmers with the availability of indigenous varieties having cylindrical fruit shape, different available coloured types (green, red, yellow, orange high yield potential, thermo and photo insensitivity and sturdy plants with indeterminate growth habit. Cucumber is another crop which is very weather sensitive crop suitable to grow under protected condition. Plants having indeterminate growth habit with constant internode length are suitable to grow under protected environment. Relatively constant throughout the length of the vine. Parthenocarpic gynoecious cucumber is also suitable for protected environment as these varieties develop fruits automatically without any pollination.



Figure 1: Polyhouse based cultivation of vegetables.

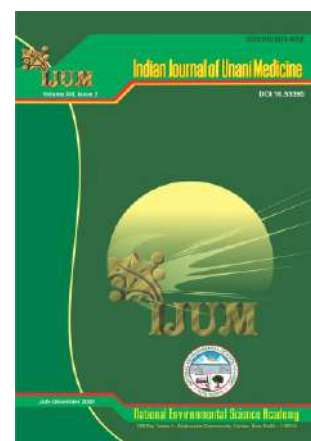
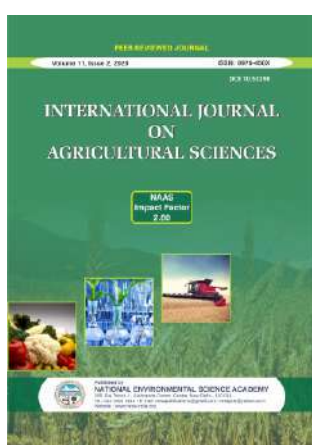
In cucumber two parthenocarpic cucumber, i.e. Pant Parthenocarpic Cucumber-2 and Pant Parthenocarpic Cucumber-3 and tomato variety Pant Polyhouse hybrid tomato-1 and Pant Polyhouse hybrid tomato-2 were released. In cucumber parthenocarpic line DPaC-6 has been developed for growing in off-season (winter season) under low cost polyhouse without using any energy.

Conclusion

Growing vegetables under protected environment is still in its preliminary stage in India and concerted efforts are required from all concerned agencies to bring it at par with the global standards. Economically viable and technologically feasible greenhouse technology suitable for the Indian agro-climatic and geographical conditions is needed at the earliest.

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