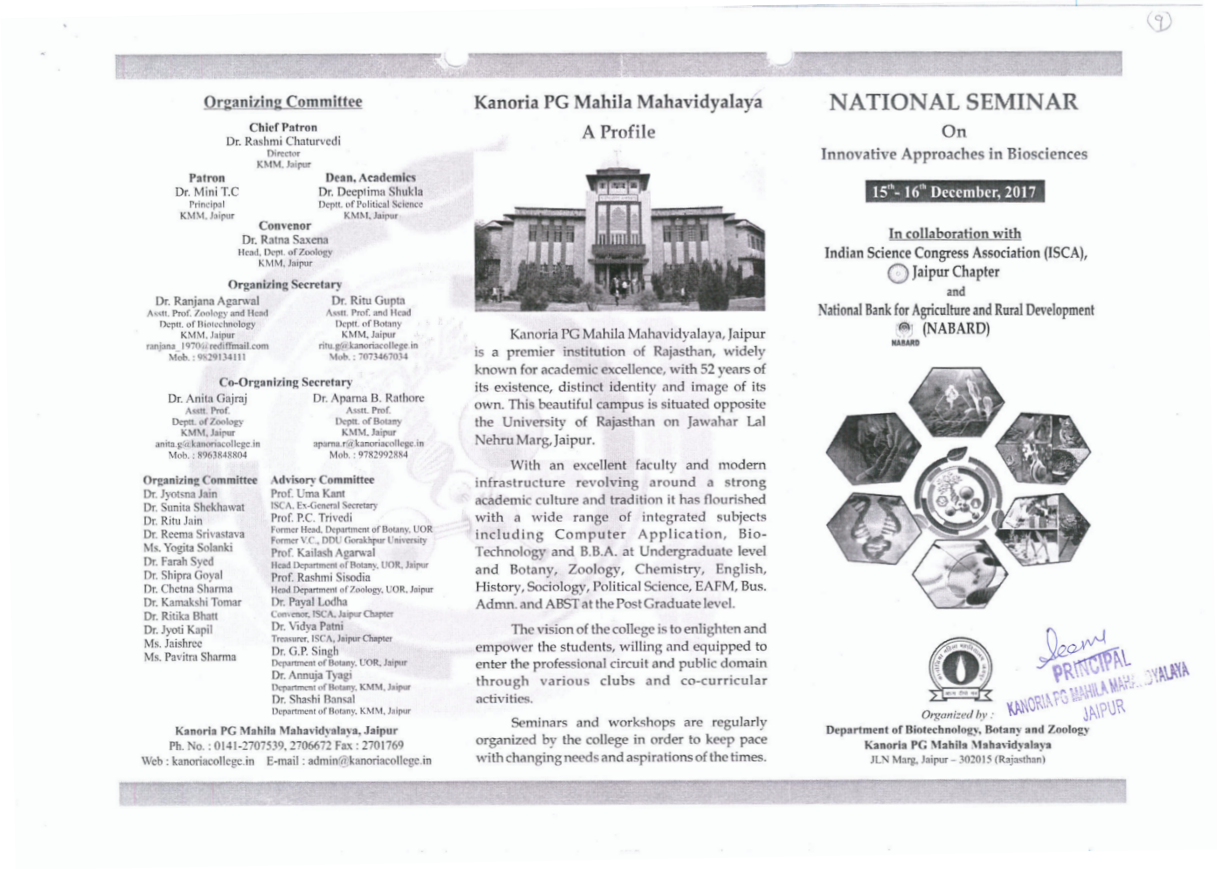
Kanoria
PG Mahila
Mahavidyalaya
Jaipur

8. National Seminar on Innovative Approaches in Biosciences

Date: 15-12-2017 to 16-12-2017

1. Brochure:



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KMM, Jaipur

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Kanoria PG Mahila Mahavidyalaya
A Profile

Kanoria PG Mahila Mahavidyalaya, Jaipur is a premier institution of Rajasthan, widely known for academic excellence, with 52 years of its existence, distinct identity and image of its own. This beautiful campus is situated opposite the University of Rajasthan on Jawahar Lal Nehru Marg, Jaipur.

With an excellent faculty and modern infrastructure revolving around a strong academic culture and tradition it has flourished with a wide range of integrated subjects including Computer Application, Bio-Technology and B.B.A. at Undergraduate level and Botany, Zoology, Chemistry, English, History, Sociology, Political Science, EAFM, Bus. Admn. and ABST at the Post Graduate level.

The vision of the college is to enlighten and empower the students, willing and equipped to enter the professional circuit and public domain through various clubs and co-curricular activities.

Seminars and workshops are regularly organized by the college in order to keep pace with changing needs and aspirations of the times.

NATIONAL SEMINAR
On
Innovative Approaches in Biosciences

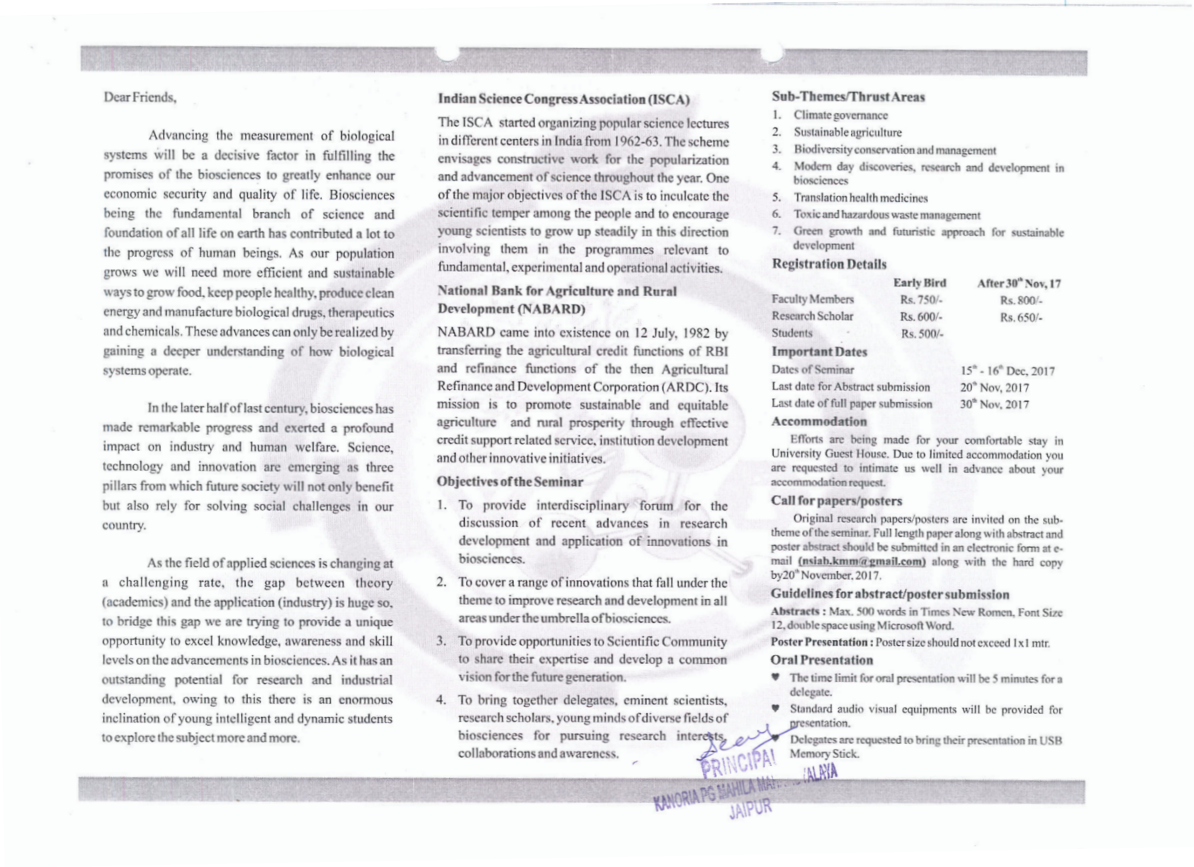
15th - 16th December, 2017

In collaboration with
Indian Science Congress Association (ISCA),
Jaipur Chapter
and
National Bank for Agriculture and Rural Development
(NABARD)

PRINCIPAL
KANORIA PG MAHILA MAHAVIDYALAYA
JAIPUR

Organized by :
Department of Biotechnology, Botany and Zoology
Kanoria PG Mahila Mahavidyalaya
JLN Marg, Jaipur – 302015 (Rajasthan)

Kanoria
PG Mahila
Mahavidyalaya
Jaipur



Dear Friends,

Advancing the measurement of biological systems will be a decisive factor in fulfilling the promises of the biosciences to greatly enhance our economic security and quality of life. Biosciences being the fundamental branch of science and foundation of all life on earth has contributed a lot to the progress of human beings. As our population grows we will need more efficient and sustainable ways to grow food, keep people healthy, produce clean energy and manufacture biological drugs, therapeutics and chemicals. These advances can only be realized by gaining a deeper understanding of how biological systems operate.

In the later half of last century, biosciences has made remarkable progress and exerted a profound impact on industry and human welfare. Science, technology and innovation are emerging as three pillars from which future society will not only benefit but also rely for solving social challenges in our country.

As the field of applied sciences is changing at a challenging rate, the gap between theory (academics) and the application (industry) is huge so, to bridge this gap we are trying to provide a unique opportunity to excel knowledge, awareness and skill levels on the advancements in biosciences. As it has an outstanding potential for research and industrial development, owing to this there is an enormous inclination of young intelligent and dynamic students to explore the subject more and more.

Indian Science Congress Association (ISCA)

The ISCA started organizing popular science lectures in different centers in India from 1962-63. The scheme envisages constructive work for the popularization and advancement of science throughout the year. One of the major objectives of the ISCA is to inculcate the scientific temper among the people and to encourage young scientists to grow up steadily in this direction involving them in the programmes relevant to fundamental, experimental and operational activities.

National Bank for Agriculture and Rural Development (NABARD)

NABARD came into existence on 12 July, 1982 by transferring the agricultural credit functions of RBI and refinance functions of the then Agricultural Refinance and Development Corporation (ARDC). Its mission is to promote sustainable and equitable agriculture and rural prosperity through effective credit support related service, institution development and other innovative initiatives.

Objectives of the Seminar

1. To provide interdisciplinary forum for the discussion of recent advances in research development and application of innovations in biosciences.
2. To cover a range of innovations that fall under the theme to improve research and development in all areas under the umbrella of biosciences.
3. To provide opportunities to Scientific Community to share their expertise and develop a common vision for the future generation.
4. To bring together delegates, eminent scientists, research scholars, young minds of diverse fields of biosciences for pursuing research interests, collaborations and awareness.

Sub-Themes/Thrust Areas

1. Climate governance
2. Sustainable agriculture
3. Biodiversity conservation and management
4. Modern day discoveries, research and development in biosciences
5. Translation health medicines
6. Toxic and hazardous waste management
7. Green growth and futuristic approach for sustainable development

Registration Details

	Early Bird	After 30th Nov, 17
Faculty Members	Rs. 750/-	Rs. 800/-
Research Scholar	Rs. 600/-	Rs. 650/-
Students	Rs. 500/-	

Important Dates

Dates of Seminar	15th - 16th Dec, 2017
Last date for Abstract submission	20th Nov, 2017
Last date of full paper submission	30th Nov, 2017

Accommodation

Efforts are being made for your comfortable stay in University Guest House. Due to limited accommodation you are requested to intimate us well in advance about your accommodation request.

Call for papers/posters

Original research papers/posters are invited on the sub-theme of the seminar. Full length paper along with abstract and poster abstract should be submitted in an electronic form at e-mail (nsiah.kmm@gmail.com) along with the hard copy by20th November, 2017.

Guidelines for abstract/poster submission

Abstracts : Max. 500 words in Times New Romen, Font Size 12, double space using Microsoft Word.

Poster Presentation : Poster size should not exceed 1x1 mtr.

Oral Presentation

- The time limit for oral presentation will be 5 minutes for a delegate.
- Standard audio visual equipments will be provided for presentation.
- Delegates are requested to bring their presentation in USB Memory Stick.

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2. List of resource person/guests:

1. Prof. P.C. Trivedi, Former VC, DDU Gorakhpur University
2. Prof. K.K. Sharma, Former VC, MDS University, Ajmer
3. Mr. A.K. Singh, Chief General Manager, NABARD
4. Dr. M. Krishna Mohan, Senior Scientist, BISR, Jaipur
5. Dr. Munjal Sinh J Parmar, Department of Botany, President Science College, Ahmedabad
6. Prof. Padma Kumar, Former Prof., Department of Botany, University of Rajasthan
7. Dr. Rashmi Sisodia, Department of Zoology, University of Rajasthan, Jaipur
8. Prof. Manoj Pandit, Former Prof., Department of Geology, University of Rajasthan
9. Dr. T.I. Khan, Director, Indira Gandhi Centre for Human Ecology, Environmental and Population Studies, University of Rajasthan
10. Prof. M Anis, Former Chairmen and Dean, Life Sciences, Aligarh Muslim University
11. Prof. Suresh Joshi, Emeritus Professor, Department of Zoology, University of Rajasthan
12. Prof. R.S. Bedwal, Former Head, Department of Zoology, University of Rajasthan
13. Prof. N.K. Gupta, Head, Seed Technology, Rajasthan Agricultural Research Institute, SKN Agriculture University, Jaipur
14. Prof. R.K. Gaur, Head, Department of Biosciences, Mody University of Science & Technology, Sikar
15. Dr. Prasant Singh, UGC-Asst Prof., Department of Botany, University of Rajasthan

16. Dr. Hemant Kumar Daima, Amity university of Biotechnology, Jaipur
17. Prof. Kailash Agarwal, Department of Botany, University of Rajasthan
18. Prof. Ashwini Kumar, Former Prof., Department of Botany, University of Rajasthan

3. Geotagged photograph of the event:

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Inaugural Ceremony of Seminar

26.88635, 75.81223

Group Photograph of Delegates

REPORT OF

NATIONAL SEMINAR

on

Innovative Approaches in Biosciences

December 15 and 16, 2017

In collaboration with

Indian Science Congress Association (ISCA),
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Organized by :

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NATIONAL SEMINAR

Lamp Lighting

NATIONAL SEMINAR

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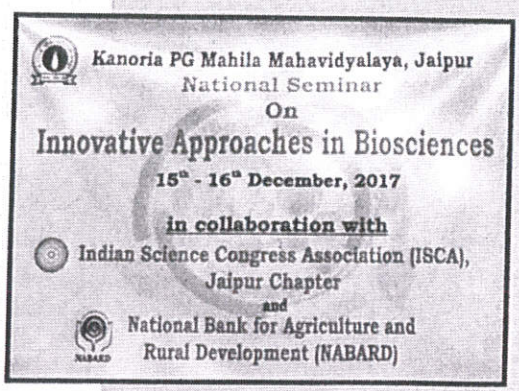
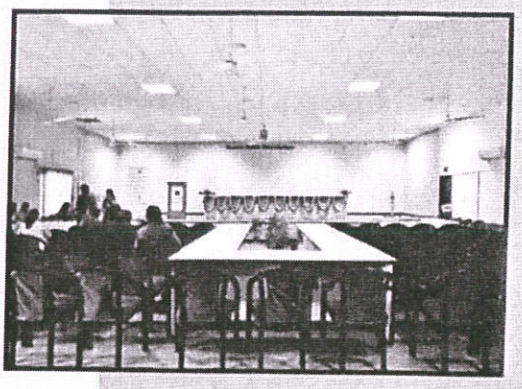


A two days National seminar entitled "Innovative approaches in biosciences" was organized in the Kanoria PG Mahila Mahavidyalaya, Jaipur in collaboration with Indian science congress association (ISCA) and National Bank for Agriculture and Rural Development (NABARD) on 15th -16th December 2017 with the core issue that science, technology and innovations are the three emerging pillars by which future society will not only be benefitted but also rely for solving challenges in our country. As our population grows, we will need more efficient and sustainable ways to grow food, keep people healthy, to conserve and manage biodiversity which nature provide us, generate clean environment and manufacture biological drugs, therapeutics and chemicals. The seminar was organized to cover a range of innovations that fall under the theme to improve research and development in all areas under the umbrella of biosciences. Green growth and futuristic approach for sustainable agriculture, Modern day discoveries, research and development in biosciences, Climate governance, Biodiversity conservation and management, Translational health medicines were the thrust areas discussed by eminent experts from Ahemdabad, Aligarh, Delhi and Jaipur.



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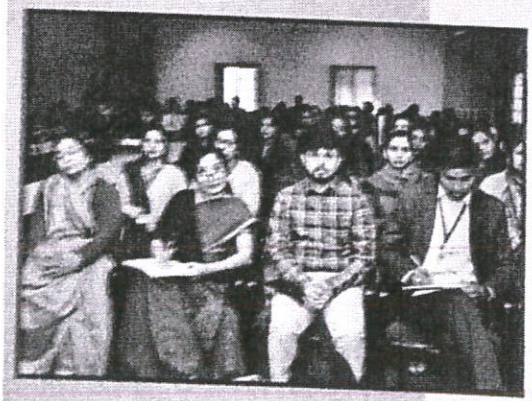


Inaugural session began with lamp lighting and welcome address by Dr Mini T. C Principal, Kanoria PG Mahila Mahavidyalaya. She wished that the seminar will be a learning forum for recent advances, research and development in biosciences.

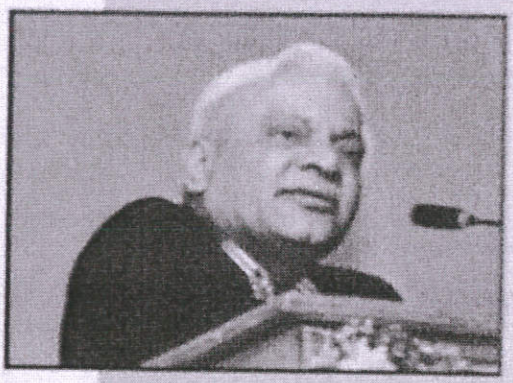
Convenorof the seminar Dr Ratna Saxena, Head Dept of Zoology, Kanoria PG Mahila Mahavidyalaya introduced the theme of the seminar. She emphasized "How innovations and Biosciences are inseparable entity". She discussed innovations such as genomic medicines, biotechnological applications, biofuels, cloning, rapid industrial growth in India, programmed drug delivery, nanomedicine, antituberclosis drugs etc. She stated that the main objective behind this seminar is to share the expertise of eminent scientist and research scholars and to present their theoretical and experimental works specially related to crucial aspects of biosciences. She was hopeful for the enhancement of academic and scientific wisdom.

Chief Guest Prof P C Trivedi, Former Vice Chancellor, DDU Gorakhpur University, Gorakhpur brought boost by presenting a very practical perspective towards science. He emphasized that applications of science should be there for solving our basic problems of food and energy. He said that green growth and sustainable development are the need of the hour. He mentioned that fruits of science need to be democratized and should reach the poor. He also highlighted the vital role of college for society. College has been playing crucial role in imparting education in overall development of society by producing citizens who are patriotic, social workers and concerned for the society. Knowledge and technology transfer should not be for profiting and marketing. It should be for overall welfare of the society. He stated the linkage of science with social science, polity and economics. For getting knowledge a person should always stay hungry and stay foolish till the end of the life. He also pointed out that in India, industries are not providing support to research, due to which many subjects like Biotechnology are on the verge of extinction. He also quoted eminent personalities like Pandit Nehru, Mahatma Gandhi, Ronald Osborn, and Swami Vivekananda in his influential and energizing talk.

Mr A K Singh, Chief General Manager, NABARD extended his thanks to the organizing team. He talked about GM crops which are important in terms of increasing the yield. NABARD is a development bank without public deposits that supports

society for development, rural infrastructure development and for women empowerment. He briefed about various biotechnological projects sponsored by NABARD for livelihood creation. Also, he focused on the need for collaboration between financial services and educationalist so there will be a direct or indirect linkage with the societal development.

Presidential remarks were delivered by Dr Rashmi Chaturvedi, Director, Kanoria PG Mahila Mahavidyalaya, who shared some inspiring thoughts about science which left an indelible marks on the minds of the audience. According to her science has come a long way in bringing the nature together to help society, mitigate problems and also innovations for the democracy. She was hopeful that deliberations here would bring change to the thought process.



Dr M Krishna Mohan, Senior Scientist, Birla Institute of Scientific Research, Jaipur in his keynote address emphasized on the most radical change in our perception of microbiome. Our own body microbes, collectively called as "Human Microbiome", carry 100 times as many genes as our own DNA and also exceed in sheer diversity of these genes. Understanding how the magic balance between the

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gastrointestinal microbiota and human body influences the human health and diseases is of prime importance. The microbiota also supply crucial ecosystem services for benefits including the production of important nutrients, bioconversion of food and protection. There are successful interventions that clinicians could follow to treat debilitating diseases that were difficult to manage with present day antibiotics. Understanding the dynamics and intentional manipulations of indigenous microbiota, may lead us to novel methods to prevent or treat a variety of diseases either by missing functions or eliminating harmful functions .He also focused some recent technology for genome analysis including 16s rRNA-gene microbial profiling and metagenome analysis.

Rapid economic growth in India has brought tremendous benefits, while continued growth is essential for further improving living standards, food and energy requirements, but so is a clean and safe environment. Without ambitious policies growth will continue to degrade environment and deplete resources critical to the welfare of current and future generations. Thus there is a need to "Go Green". In view of this First day, **Technical session I was on Green Growth and Futuristic Approaches for Sustainable Agriculture,** which was chaired by Prof Padma Kumar (Retd.), Deptt. of Botany. University of Rajasthan.

Speaker Prof N K Gupta, Head, Seed technology, Rajasthan Agricultural Research Institute, SKN Agriculture University, Durgapura talked on climate smart agriculture towards green growth and sustainable development. He mainly focused on challenges and possible solution of changed climate

conditions to sustain food and nutritional security of the country. Feeding additional population with stagnant productivity of agricultural crops with limited scope of expansion of area under cultivation is a major challenge. The changing environmental conditions and frequent occurrence of biotic and abiotic stresses during crop ontogeny further makes it more difficult. To overcome these limitations, development of need based crop varietiesispriority. In recent years, the identification of novel traits and phenotyping of large set of genotype for these traits are being perceived as key for enhancing the productivity of crops under stressenvironment. He also talked about huge variability in wheat genotype for drought and heat stress tolerance along with accumulation of hsp70 and hsp 90 under high temperature condition.

Dr R K Gaur, Head of Department of Biosciences, Mody University of Science and Technology, Lakshmangarh, Sikar explained that resistance to plant viruses can be conferred by transgene mediated RNA silencing and generation of interfering RNA's.Virus diseases of plant in India occasionally cause serious damage and large economic loss. The amount of loss can vary from 5% to 90% depending on the virus disease involved, strain of the virus, variety, the age of plant at infection time ,the temperature during disease progress, the presence of other diseases and the extent that viruses have spread in the plant. He also highlighted economic impact on world flora due to viral diseases. He gave information about the natural host plants and vector capacity for transmission of begomoviruses family in Northern states. According to him, viruses or part of viruses may be used to develop plant expression vector to produce high value product (such as medical vaccines) known as biopharming. He also emphasized the potential benefits of such technologies for agriculturally based country like India, with increasing demand of staple food (such as wheat and rice), to improve economy of the nation.

Ms Divya Sharma, student of BSc Biotech Part III , Kanoria PG Mahila Mahavidyalaya, Jaipur in her paper entitled "Effect of rising temperature stress on growth and physiology of domestic crop (wheat) of Rajasthan" stressed upon effect of heat stress on wheat varieties (Lok- 1, Raj 4120, Raj 4037, Raj 3765 and DBW- 90) and there mechanism to combat the stress. She concluded that Raj 4037 and Raj 3765 varieties were best suitable for the Rajasthan in the increasing intricacy of global temperature rise.

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Dr Nisha Jain, Department of Zoology, Government College, Tonk, presented her paper on Waste management of floral offerings by vermicomposting and its effect on soil and plant growth. She assessed the integrated effect of all nutrients present in floral waste vermicompost (developed from flower waste generated by few major temples of Jaipur city using Eiseniafoetida earthworm species) results in the increased growth and yield of tomato plants and also played a crucial role in improving soil properties. She concluded that vermicomposting of temple flower waste is an excellent and ecofriendly method to get valuable products which will lead to a healthier and waste free environment.

Ms Jyoti Dhariwal, B.Sc. Biotech part II student gave oral presentation on topic entitled "Production of biofuels from vegetable and fruit waste". She described an efficient way of producing second generation biofuel i.e. bioethanol from fruit waste like Banana, Orange and Papaya peels. She concluded that orange gave the maximum yield of ethanol. She stressed that bio-ethanol is more sustainable to replace petrol and thus can be an efficient alternative to the aggravating pollution problems globally.

Poster presentation was conducted parallel outside the auditorium, in which various researchers and students illustrated their research method and outcomes. In all, approximately 35 posters dealing with different themes were presented in the seminar. Posters were evaluated by Dr Aparna Pareek, Assistant Professor, Department of Botany, University of Rajasthan, Jaipur. Poster entitled "Reversible contraception with Risug in male rabbits" presented by

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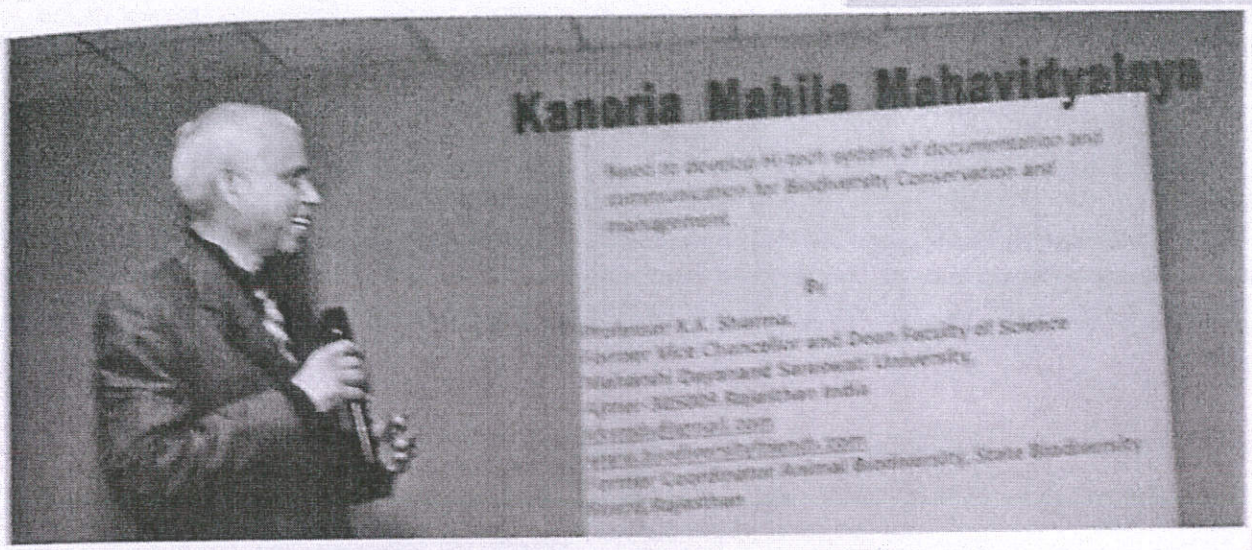

Ayesha Badar got the first prize. Dr Seema Jacob, Dr Neena Nair, Dr Ranjana Agrawal and Dr Susheela Baidwal got the second prize for poster entitled "Antioxidant defense system and oxidative stress in the epididymis of Zn deficient weanling Wistar rats: Measuring the antioxidant enzymes like superoxide dismutase (SOD), estimation of lipid peroxidation and Zinc. Third prize was given to Preeti Nayak and Mamta Choudhary for the poster entitled "Ecosystem services of Mukundara National Park of Kota division".

Biodiversity boosts ecosystem productivity where each species, no matter how small has an important role to play. Greater species diversity ensures natural sustainability for all life forms. Conservation of biodiversity leads to conservation of essential ecological diversity to preserve continuity of food chain. In light of this, **Second technical session was on "Biodiversity Conservation and Management".**

Speaker **Prof K.K. Sharma**, Former Vice Chancellor, M.D.S. University, Ajmer showed his concern to develop Hi-Tech system of documentation and communication for Biodiversity conservation and management. He drew our attention towards the incomplete documentation of biodiversity and its status because of the usage of obsolete tools of species identification and database communication in biodiversity management.

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Conventional methods often fail in identification and detection of a species in dense canopy and far remote areas of a forest and oceans where visibility is poor. He stressed upon the use of modern tools of visual encounter such as infra red night vision camera, GIS and Bioacoustic tools so that a system of regular monitoring on the status of biodiversity is achieved. It is very essential as economies are much dependent on biodiversity and their sustainable use.

Speaker Dr Munjal Sinh J Parmar, Assistant professor, Department of Botany, President Science College, Ahmadabad, presented his views on ethanobotanical studies as a tool for successful biodiversity conservation. He talked about four major objectives of ethanobotanical studies to conserve traditional knowledge about plants and their uses, to raise consciousness about its importance for local population, to demonstrate the need for sustainable practices to conserve nature and to disseminate the information gathered to the scientists, researchers, policy makers, administrators etc., so the researches and development strategies for the benefit of local population can be improvised.

Dr Rashmi Sisodiya, Head, Department of Zoology, UOR and chairperson of the session in her concluding remarks stated that documentation is very important for conservation. Traditional knowledge about various medicinal plants is deteriorating.

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On the second day of the seminar i.e. 16th December 2017, in technical session III on "climate governance" eminent speakers enlightened the participants widely on multiple direct and indirect consequences of climate change on life on globally.

Speaking on climate change: Along termperspectives Prof Manoj Pandit (Retd). Dept of Geology, University of Rajasthan, in his talk dealt with global warming, green house gases, fossil fuels, CO_2 ice core records and its effects on life. He explained the difference between climate change and global warming by using of bitalparameters, Koppean classification system etc. He shared his experiences of Antarctica and talked about the methodology of studying ice core through different models like delta D (ratio of hydrogen to isotopic lighter hydrogen) and oxygen isotope modelling. According to him, we are accelerating the pace of climate change which will be detrimental for us. He emphasized the need of taking action before it becomes too late.

Speaker Dr T I Khan, Director, Indira Gandhi Centre for Human Ecology, Environmental and Population Studies, University of Rajasthan, highlighted the impact of climate change on environment and human being. He presented his views towards the vicious circle of growing pollution on climate. Combating climate change means transforming our energy in transport systems. We need to produce energy and travel freely while reducing carbon emissions that means moving past fossil fuels. Byproducts from burning fuels such as gasoline and coal are causing health problems and climate effects around the world especially in India's growing cities. He suggested to limitourself, to become less consumer able, reduce deforestation and reduce consumption of electricity to combat the situations.

Dr Shalini Jauhari and Usha Yadav from Strex University, Gurugram presented a paper entitled "Changing scenario of air: An analogous approach on health".DrShaliniJauharidrew audienceattiention towards the adverse situation of air in NCR which may be due to continuously brewing in the past. According to her, Authorities of Pollution Control Board were concerned but the policy makers were not ready to understand and make changes which worsened the situations. She assessed air quality index of three years in particular time scale in Delhi NCR. On the basis of results she found alarming situations, for which strict action is required right now. She ended up with message save environment stay healthy.

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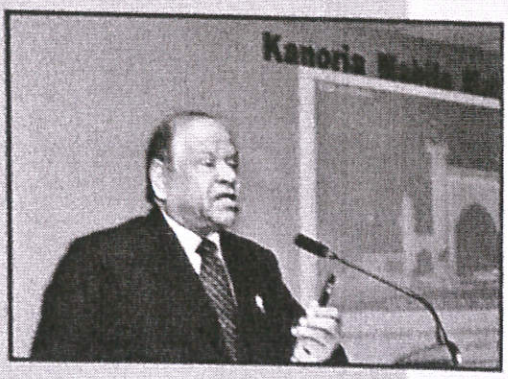


Ms Baby Sharma, M.Sc. Biotechnology presented a paper entitled "Biodegradation as an approach for treatment of effluent from dairy industry by indigenous bacterial isolates". She talked about new active strains which can bring about fast biodegradation of the organic compounds and found strain R3 (long rods bacilli) as a best bioremedial strain out of the three isolated strains. Therefore, the bacterial isolates can be potentially used as bioremediation agents for treatment of dairy waste water.

Prof Suresh Joshi, Emeritus Professor, Deptt of Zoology, University of Rajasthan chaired the session.

Technical session IV focused upon Modern day discoveries, research and development which was chaired by Prof R.S. Bedwal (Retd.) Head, Department of Zoology, University of Rajasthan, Jaipur. The speaker Prof M Anis, Former Chairman and Dean, Life Sciences, Aligarh Muslim University, Aligarh stated about the extinction of medicinal plant species due to unscrupulous human activities like industrialization, deforestation ,global warming and climate change. He emphasized upon germplasm preservation ,tissue culture and synthetic seed technology for rapid multiplication and conservation of medicinally and economically important plant species. He said that most important prerequisite in the micro propagation of plant species is true-to-type clonal fedility. PCR based techniques like RAPD and ISSR were adopted to raise plantlets indifferent species, in which monomorphic DNA banding patterns among the regenerants confirms the genetic uniformity of micro propagated plant lets.

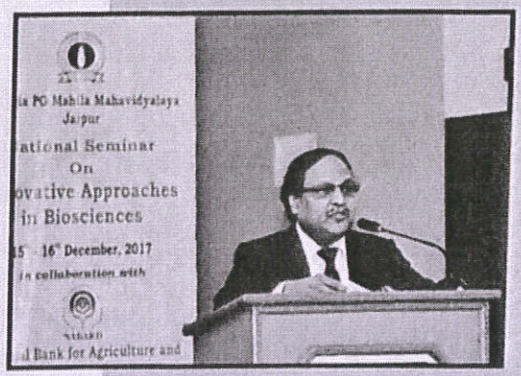
Dr Prasant Singh, UGC-Assistant Professor, Department of Botany, University of Rajasthan, Jaipur spoke on new promising trends in improving crop disease resistance. He gave an insight to the plant's natural defense and priming in crop improvement. In the absence of genetic resistance in crops ,food production heavily depends on use of chemical to control pathogens. Despite their effectiveness, chemical based plant defense have detrimental environmental consequences and create risks to the wider environment. In the 21st century the major goals of plant research is to increase our understanding to the plant defense system. Apart from their innate immune system controlling pre programmed defense reactions, plant can also increase the responsiveness of their immune system in response to selected environmental signals. This phenomenon is known as "defense priming" which once induced, priming can be maintained throughout

the life of a plant and inherited epigenetically to following generations. Parental stress also increases offspring resistance which is known as Transgenerational immunepriming (TGIP).

Session V of the seminar on **"Translational Health Medicines"** was chaired by Dr Parasant Singh, UGC-Assistant Professor, Deptt of Botany ,University of Rajasthan, Jaipur. In this Session Dr Hemant Kumar Daima Assistant Professor, Amity Institute of Biotechnology, Amity University, Jaipur, overviewed about the articulate engineering of nanomaterials for biomedical application with special attention on their toxicological perspectives. Controlled synthesis, unique properties and tranquil surface modification with chemical or biological moieties makes engineered nanomaterials appropriate for a variety of biomedical applications. Nano-bio interfacial communications are motivated by colloidal forces and primarily depend on the dynamic physico chemical and surface properties of nanomaterial. According to him wisely designed nanomaterials can be used for a variety of applications such as bio-molecular detection and diagnostics ,therapeutics , drug and gene delivery, fluorescent labeling and tissue engineering, biochemical sensing and other pharmaceutical applications.

Valedictory address was delivered by **Prof Kailash Agarwal**, HeadDeptt of Botany, University of Rajasthan. Presenting to dimensions of biosciences he said that innovation is the foundation of 21"century bioindustry and it is the innovative nature of biosciences that makes it so resilient. Innovation happens when scientists and researchers with different expertise and ideas work with each other, it happens when ideas collide with each other. More open discussions, open laboratories and mixing of academia leads to intersection of disciplines and ideas and enables creation of new science entrepreneurs and encourages these minds to think ways to convert discoveries into innovations than can translate into useful products and solutions and may result in tangible outcomes.

Prof Ashwini Kumar (Retd.) Department of Botany ,University of Rajasthan in his presidential remark concluded with the thought that in present scenario biosciences and allied sectors are gaining much importance in India than ever before in industry ,biomedical ,basic research and in the understanding of our spectacular biodiversity. We envision India as a nucleus for research in frontier areas in near future.



NATIONAL SEMINAR

Organizing secretary Dr Ranjana Agarwal, presented the report of seminar. The seminar ended with a vote of thanks by Dr Ritu Gupta.

Overall, the seminar threw light on the various dimensions of biosciences and technological issues discussed by eminent personalities from different arenas.

Following **recommendations** emerged from the presentations of distinguished scientists, academicians and papers presented in the seminar :

1. Dissemination of knowledge to youth about current innovations should be regularly donein classrooms so that their perceptions about practical application gets improved.
2. Outcome of researches should be implemented in the fields.
3. More open discussions, open laboratories and mixing of academia leads to intersection of disciplines and ideas and enables creation of new science entrepreneurs and encourages these minds to think of ways to convert discoveries into innovations, then can translate into useful products and solutions which may result in tangible outcomes.

4. Strategies for climate change including open top chamber for high CO_2 should be adopted.
5. Temperature gradient tunnels should be adopted for crops justlike IARI develop temperature gradient for chick pea and potato crops.
6. New varieties or seeds should be developed which can tolerate extreme climate conditions such as decline in water level, >0.4m/yr rise in temperature (after 35°C every 1°Crise in temperature causes loss of 2.5 hectare tons yields).
7. Wheat varieties like Raj 4083, HD2932, 2967 gave higher yield in heat stress conditions and should be chosen for sowing.
8. Pearl millet (RHB173) with high antioxidants is better tolerant to stress.
9. Management strategies include crop rotations, crop diversification and tolerant crop varieties should be adopted.
10. Adopt resource conservation technologies such as no-tillage, laser land leveling and direct seeding of rice.
11. Seed bed method- Ridge and furrow, Raise bed, pair row method etc should be employed.
12. Adaptation strategies may include water harvesting, field management, weed control and reduction in water consumption.
13. Development of need based crop varieties should be a priority to meet the demand.
14. Using plant resistance genes and their cloning for developing disease resistance varieties is a convenient alternative to pesticide or any chemical methods employed.
15. Sharing of plant genes to fight crop disease is another useful strategy to boost disease resistance as immune signaling pathways are fairly similar in distant plant groups.

16. Complete documentation of biodiversity and its status should be done.
17. Modern tools of visual encounter such as infra red night vision camera, GIS and Bioacoustic tools should be used so that a system of regular monitoring on the status of biodiversity will be achieved.
18. Ecotourism can be a tool for biodiversity and grassland conservation which can bring about economic, socio cultural and environmental benefits for govt, private sector and local communities if well implemented.
19. Traditional knowledge (importance and uses) about plants should be gathered and disseminated to the scientists, researchers, policy makers and administrators etc so that consciousness about the importance of that plant be raised.
20. Indigenous bacterial isolates (gram positive long rod bacilli R3) can be applied for biological treatment of effluent from dairy industry (waste treatment) as the organic matter in the waste water is used as food source by these indigenous bacterial strains.
21. Vermicompost produced from the floral wastes may be a good alternative to solve the problem of disposing such waste and reduce the requirement of more land for disposal of waste flowers from the temples in near future.
22. Green fuel developed from waste (fruits and vegetables) by fermentation technology may be an optional source of fossil fuel to decrease the level of CO_2 on environment.
23. The direct offshoot regeneration and proliferation of plants is of great significance in rapidly cloning the desirable genotype, whilst the indirect regeneration is important for creation of variants and crop improvement.

Last but not the least, convenor Dr Ratna Saxena and organizing secretaries Dr Ranjana Agrawal and Dr Ritu Gupta on behalf of entire team would like to extends sincere thanks to **NABARD** for providing financial support without which this seminar would not be possible.

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