# CGES Newsletter

CLEAN AND GREEN ENVIRONMENTAL SOCIETY

Lucknow (India) Vol. 6 No. 1 January 2021

SPECIAL ISSUE


**VISION**

Clean and Green Environment for Healthy Life

**MISSION**

To Strive for A Clean and Healthy World

## In This Issue




**Clean and Green Environmental Society**
Green Villa, 2/111, Vishwas Khand,
Gomti Nagar, Lucknow-226 010
(U.P.), India
Telephone: 0522-4006408;
Mobile: +91-9415343141
E-mail: cleanandgreenenv@gmail.com
scsharmagardener@gmail.com
Website: cgesindia.org


## PRESIDENT'S MESSAGE

प्रिय सदस्यगण, नमस्कार

On behalf of the Clean and Green Environmental Society (CGES) and on my own behalf, I extend you best wishes for your health and well being for the New Year 2021 !

The last five years of CGES have been quite fruitful as we have organized several conferences, seminars, webinars, plantation drives, lectures, workshops, rural development programs, skill development activities, hands-on training on Bonsai culture, national conferences and foundation days.

After the completion of five years, we have elected a new Executive Body and extend our thanks and gratitude to the outgoing Executive Body Members for their hard work and dedication that they had shown during the period. My heartfelt thanks and gratitude to Dr. S.C. Sharma, Secretary General, who has been a driving force in making the CGES, a vibrant and sustainable society.

CGES publishes biannual Newsletter for covering the activities of the society, and articles on the current environmental and related issues. I would like to express my sincere thanks to the Editorial Team comprising Dr. A.K. Singh, Prof. Y.K. Sharma, and Dr. S.C. Sharma for their dedication making the CGES Newsletter a significant publication.

A fond farewell to Dr. Sharma, who shall be laying down office of the Secretary General in January, 2021 but will continue for giving his valuable guidance and support to the Society as the Senior Vice President in the Executive Body. I also thank Organizing Secretaries and Team Members of CABH-2020 for organizing the CGES-NBRI National conference in a well planned manner which was a grand success.

I am grateful to the CGES Advisors, Executive Councillors and Life Members for their constant advice, co-operation and support. My profound thanks to Prof. S.K. Barik, Director, CSIR-National Botanical Research Institute, Lucknow for his whole hearted support to the CGES. Last, but not the least, I deeply appreciate the efforts of Col. Ajay Gupta, Advisor, Information Technology for preparing the Dictionary of the CGES members.

I extend a very warm and cordial welcome to our new Executive body Members, who shall formally take charge in January, 2021 and we look forward to their guidance, help and support in taking the Society forward. These are difficult time due to Covid pandemic and we need to take care of our self and our loved ones.

''पर्यावरण के लिए पेड़ लगाओ, देश बचाओ, दुनिया बचाओ!
अब बोलेगी चिड़िया डाली डाली, पहले फैलाओ चारों तरफ हरियाली!''

सुमेर अग्रवाल

(इं. सुमेर अग्रवाल)
President, CGES & Chairman, Levana Group
Lucknow -226 001
Email: sumeragarwal@gmail.com

## CGES New Life Members

Dr. Mohd. Zahid Rizvi, Mrs. Ranjana Trivedi, Dr. Anjaneya Sharma, Mrs. Shaiphali Mishra

## Messages

Dr Amrita Dass

The prolonged lock down following the outbreak of the COVID 19 pandemic resulted in an all round rejuvenation of our environment.

After many years we could breathe unpolluted air. The clean waters saw a resurgence of aquatic life. It was a joy to behold such a beautiful 'green' landscape!

This clearly established the importance of sustainable life styles which depend largely on being mindful of our carbon footprints. Clean and Green Environment Society (CGES) continues to create awareness about all these critical issues by engaging meaningfully with all stakeholders.

HEARTIEST CONGRATULATIONS to CGES for its impactful contribution towards preserving and re revitalizing our fragile eco system. Kudos to Er. Sumer Agarwal, President, Dr. S.C. Sharma, Secretary General, the Executive Body members of CGES, the editorial team of this newsletter and volunteers for their unstinting and dynamic efforts in making a difference.

All the very best for all your future endeavours !

**Amrita Dass**
Founder Director
Institute for Career Studies, Lucknow
E-mail: amritadass@gmail.com

Dr. Prerna Mitra

It is my proud privilege to be associated with the Clean and Green Environment Society.The objective to save the environment and including innovative techniques, has been successfully fulfilled due to the unconditional services and dedication of the Stalwarts of the Society.

I am extremely grateful to Dr. S.C. Sharma, Secretary General, CGES and the entire Executive Body for giving me an opportunity to participate in the activities of the Society.

The Executive Body has been very active in conducting plethora of programs and with the strong team spirit, Society has progressed leaps and bounds.

It was my immense pleasure that I have participated in the CGES-NBRI National Conference, February, 22-23, 2020, Foundation Day, July 8, 2020, Seminars and Webinars, which gave me an opportunity to enhance the horizon of knowledge on the current environmental issues.

I am indebted to Mrs. Parvati Sharma who shares the responsibilities of the Society and source of inspiration to me in the Environmental and Educational programs.

I sincerely wish to render my services and to be an active member of the Society.

**Prerna Mitra**
Principal, Army Public School, Lucknw
E-mail: mitra.prerna10@gmail.com

Er. N.K. Trivedi

Dr. S.C. Sharma and myself met in one of the meetings of Club of Lucknow and from the first day we developed respect and admiration for each other. Our wavelength and frequency were the same so we shared the same table whenever we used to meet during the meetings. I am a silent observer while Dr. Sharma is a prolific orator, always ready to seek clarifications from the speakers. It was during one of these meetings, Dr. Sharma mentioned about the Clean and Green Environmental Society (CGES) and proposed that I should also become member of the Society and thus I was inducted as the Member of the CGES in February 2016. CGES stands for Clean and Green Environment Society for healthy life and strives for a clean and healthy world. I am happy that I took a wise decision to become a member of the Society and shall try to contribute for achieving the aims and objectives of the Society to the best of my capacity. Under the dynamic leadership of Dr. Sharma, during the short span of five years, the Society has become a very active NGO. Society has organized two National Conferences five Foundation Days and number of brief sessions on very relevant topics covering important aspects of Air and Water Pollution, Bio-diversity, Climate Change, Health and Environment for the benefit of the CGES, members and cross section of the society. For most of us, the Society has been a source of environmental education and awareness and we have become wiser from the stage where we started. I have made sincere efforts to attend to these meetings regularly, because always wanted to learn something new and topics discussed in the meetings were relevant to our daily life and at the same time were very meaningful e.g. Vertical Gardens, Kitchen Gardening, Vermi Compost, Bio farming and Hands on Training on Bonsai Culture. One of the meetings was organized in the form of the workshop at the

premises of Chandrika Devi Mandir at Bakshi ka Talab, where Dr. A.K. Singh, former Chief Scientist and many Senior Scientists from CSIR-CIMAP addressed the gathering and gave demonstration for making Dhoop Batti, Agarbatti and Vermi compost. All the members who participated were given the packets of Agarbatti and of Vermi compost as a gesture on the part of CSIR-CIMAP.

Indeed without individual change, there cannot be social change. Humanity in the 21st century faces the biggest challenge of environmental degradation and its own existence because of ever increasing pollution in different fields of human activities. Continuous environmental degradation has adversely affected the quality of life on this planet, which is a matter of great concern to all of us. We should realize the necessity of nurturing socially aware individuals, who can contribute to improve the society and the CGES can play an important role in this endeavor. Dr. S.C. Sharma is known as the Green Man, who liberally donates the pollution tolerant and house plants to the CGES members who visit his Green Villa.

**Er. N.K. Trivedi**
Former Director, Scooters India Limited, Lucknow
E-mail: nkt_2004@yahoo.co.in

## Articles

# Lucknow: City of Parks and Gardens

**S.C. Sharma and Parvati Sharma**

Lucknow is a historical city and for many centuries remains the Heart of North Indian Culture. The city was famous for its Adab and Tehzeeb (courtesy and manners), origin of Kathak dance, intricate embroidery and beautiful Parks and Gardens. The capital city of Uttar Pradesh was established on the banks of Gomti river. It is an ancient city, which was earlier known as Lakshman Puri, named after Laksman, younger brother of Lord Rama. Nawabs in the time of King Aurangjeb shifted to Lucknow and made Lucknow the capital of Avadh region. These Nawabs were Shia Muslim, descendents of the Iran Kings. Nawabs of Lucknow were having very high aesthetic values, which they brought from Iran. Lucknow is situated at an altitude of 123 meters above the sea level in the heart of Eastern Uttar Pradesh, the largest state of the country. City is surrounded by the unrelentingly at the Gangetic plain with an average temperature 25.7 degree centigrade and annual rainfall 1000 mm. The city has subtropical climate and soil is sandy loam. Lucknow is well known for delicious mangoes. Dasheri famous mango variety originated in the Dushhari village. There are nearly 800 mango varieties named after famous personalities. Nawabs of Lucknow established parks and gardens in every nook and corner of the city. There are nearly thirty big sized Parks and Gardens in Lucknow.

With the urbanization, industrialization and demographic pressure, some of the famous Gardens e.g. Char Bagh has turned into Railway Station and Lal Bagh became the business market and cinema hall. Aish Bagh has come up as timber market. Banarasi Bagh has been converted into the Zoological Garden, which is now rechristened as the Nawab Wajid Ali Shah Zoological Garden.

**Sikander Bagh:** Was established by Nawab Wazid Ali Shah, who named after his most beautiful and favourite Begum Sikander Mahal. During British era in 1957, Sikander Bagh became the battle field between freedom fighters and British soldiers. There is a Banyan tree (Ficus benghalensis) in the garden, which is nearly 250 years old. A lady named Udha Devi was hiding at the top of the Banyan tree and showering bullets on the British soldiers. After killing 20 soldiers, she was spotted and shot down. On the Sikander Bagh Chauraha, in the memory of brave lady Udha Devi, a statue has been installed.

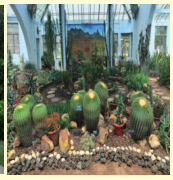
In course of time, Sikander Bagh became the seat for plant propagation of the State Horticulture Dept. After independence in the year 1953, Sikander Bagh was named as the National Botanical Garden (NBG) and Padma Bhusan Prof. K.N. Kaual was appointed as the founder Director. In 1976, NBG was rechristened as the National Botanical Research Institute (NBRI), which is a plant based research institute and Botanical Garden is the part of Institute. Botanic Garden covers an area of 25 hectares, which is the repository of plant genetic resources. Botanic

Nawab Wajid Ali Shah

Old Sikander Bagh Gate

Begum Sikander Mahal

Veerangana Udha Devi



Views of the Botanic Garden

Garden is the National facility for the researchers. Garden has become a reference centre for the Bougainvillea, Chrysanthemum and Gladiolus. Botanic Garden and Floriculture Division has evolved many novel cultivars of Bougainvillea, Chrysanthemum and Gladiolus, which are highly popular in the floriculture markets. Conservatory, Cactus and Succulent House, Fern House, Moss Garden and Jurassic Gallery are the star attractions to the visitors. Botanic Garden serves as the lungs in the congested city and thousands of Lucknowites come in the early morning for walking and filling their lungs with the oxygen. NBRI organises two Flower Shows annually for promoting the interest in floriculture industry. Chrysanthemum and Coleus Show is organised in December while Rose and Gladiolus Show in January. Institute displays germ-plasm collection and R&D work on Floriculture and the exhibitors bring large number of entries for competition.

**Banarasi Bagh:** Situated in the heart of city covering an area of 29 hectares. In 1921, it was converted into Prince of Wales Zoological Garden. Zoo is now rechristened as the Nawab Wajid Ali Shah Zoological Garden. There are many heritage trees e.g. Adansonia digitata (Baobab) in the Zoological Garden.

Botanical and Zoological Gardens in different climatic zones are established for the ex-situ conservation of the rare, endangered and threatened (RET) species as well as for the captive breeding.

**Raj Bhavan:** It is the official residence of the Governor of Uttar Pradesh. Raj Bhavan is more than 1200 years old. It used to be Kothi Hayat Bux. There is a palatial building for the residence of the Governor surrounded by beautiful garden. Annual Flower, Vegetable and Fruit Show is organised, where a large number of entries come from all over the State for competition. Nurserymen put their stalls at the periphery of the show ground for the display and sale of all sort of plants, seeds fertilizers and garden tools.

**Purdah Bagh:** Was established in Aminabad especially for ladies and the maintenance of the garden was done only by the female workers. At one time in the Purdah Bagh, there was beautiful collection of the heritage roses.

**Vilayati Bagh:** Was established for an European wife of Nawab Wajid Ali Shah. This garden was lying in the deserted condition and now the Archaeological Department has started the rejuvenation work of the garden.

**Begum Hazrat Mahal Park:** Situated in the heart of Lucknow, Park was built in the memory of the second wife of Nawab Wajid Ali Shah. She rebelled against the British East India Company during the India Rebellion in 1857. The garden and monuments were constructed by the Indian Government to commemorate her contribution to the 1957 revolt.

**Begum Hazrat Mahal** **Monuments in Hazrat Mahal Park**

The impressive garden is in the posh area of Hazratganj, planted with ornamental trees and shrubs. The greenery and serenity around the garden draw visitors coming to Lucknow. Citizens come for the morning walk in large numbers for breathing the fresh air.

**Qaisar Bagh:** Complex comprises many grand heritage monuments of lucknow that was built in the Nawab era, situated in the heart of the city. There is an elegant building called white Baradari, which was constructed in the year 1854 by Nawab Wajid Ali Shah. After the departure of Nawab Wajid Ali Shah, a revolt broke out in Avadh and it was Begum Hazrat Mahal who made Qaisar Bagh as the citadel for the revolt. During the period (1862-1867), Britishers handed over the Qaisar Bagh to the Taluqdars of Avadh. These days the premises of Qaisar Bagh are used for hosting the exhibitions and marriage receptions. Either side of the Qaisar Bagh there are gardens covered with ornamental trees, shrubs, lake and bridge. People from the congested and polluted area of Aminbad come here for walking.

**Musa Bagh:** Also known as the Monsieur Bagh is an extensive Garden complex, situated on the Hardoi Road, Lucknow. In the Musa Bagh a monument was constructed as the residential place for the Nawabs and their Begums. The fifth Nawab of Awadh, Saadat Ali Khan (1798-1814) constructed the monument following the pattern of the French architecture on the banks of river Gomti River.

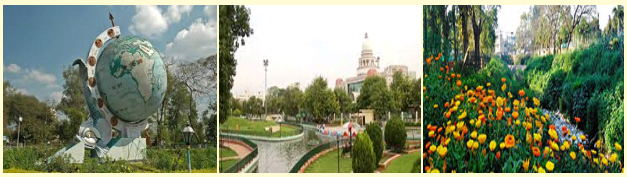

**Dikusha Garden:** Situated in the Cantonment area of Lucknow and depicting Indo-French architecture and massive garden, Dilkusha garden is not just the region for sightseeing but it also permits us to thrive a self-indulgent second to one. Dilkusha Kothi and Garden were constructed in 1830, which was renovated by Nawab Nasruddin Haider. It is designed for conserving seamless blend of two cultures popularly known as the Ganga-Jamuni Tehzib. Rumi Foundation of Nawab Wajid Ali Shah Lucknow Chapter celebrates Kathak Dances and Kawalis in the Dilkusha Garden. Nawab Wajnid Ali Shah festival in Lucknow is known for reminiscent of the narrative of its erstwhile splendour bringing to life its arts and crafts.

**Contemporary Parks and Gardens:** With the passage of time, city expanded with the population explosion after sixties new parks and gardens have been constructed e.g. Lakshman Park, Globe Park, Buddha Park, Hathi Wala Park, Shahid Smarak, Lohia Park, Janeshwar Mishra Park.

**Laksman Park:** Situated by the side of Begum Hazrat Mahal Park, it was constructed by the Lucknow Municipal Corporation. Statue of Lord Lakshman with bow and arrows, has been installed in the park surrounded with the beautiful garden.

**Veervar Lakshman**

**Globe Park:** It is a small recreational area situated also near the Begum Hazrat Mahal Park. The park is known as for its globe sphere representing all the continents, oceans and seas. The globe is fixed with the help of semicircle, which features zodiac signs and has huge mythical fish at its foot. The Earth model used to rotate attracting the visitors. Padma Bhushan Col. V.R. Mohan, Mayor of Lucknow Municipal Corporation gifted this globe for installing in the park



**Gautam Buddha Park:** Situated in Dali Bagh is the ideal park for the travellers especially for the kids. Buddha Park is one of the most beautiful places for visiting in lucknow. Park is a nice evening tourist spot in lucknow to beat the blistering heat of summer. Gautam Buddha Park was established in the year 1980 and since then it has remained the main attraction of Lucknow. Along with lush greenery, this popular tourist site also includes kid's rides, electric swings and paddle boats. Gautam Buddha Park is also an ideal place for picnicking and day outing with friends and families.

**Haathi Wala Park:** Situated by the side of Gautam Buddha Park in Dali Bagh. There is a huge statue of an elephant In the park with a beautiful garden. It is one of the most visited site especially by the children. In the park, there is a children corner with playing apparatus.

**Shaheed Park:** Located on the bank of Gomti river, Mahatma Gadhi Marg. On the auspicious occasion on 28th anniverasary of the Independence Day, the Honorable Chief Minister, Shri Hemwanti Nandan Bahuguna inaugrated the Shahid Park. There is tall tower with a clean space, where one can take a stroll and pay respect to the martyrs.

**Ambedkar Memorial Park:** It is a public park and the memorial is situated in Vipul Khand, Gomti Nagar, Lucknow. The area of the park is 44 ha. Water flows from the top of 80 ft. pyramid. Foundation stone of the park was laid in 1995 and opened to the public in 1998. The memorial

park was dedicated to Dr. B.R. Ambedkar, the 20th century polymath and the Father of Indian Constitution. Special features of the park are 62 elephants nicely carved in stone, which are standing at the entrance of park. Drshya Stupa and magnificent bronze statue of Dr. B.R. Ambedkar .

**Lohia Park:** Dr. Ram Manohar Lohia Park is situated in Bipin Khand, Gomti Nagar. The park was developed by the Lucknow Development Authority (LDA) in 2007 in the memory of great Socialist leader Dr. Ram Manohar Lohia. Park is beautifully landscaped and basically a leisure park, which is highly popular tourist spot in Lucknow. This is one of the best parks of India, where one can enjoy the nature. Total area of the park is 30 hectares. There are water bodies where ducks and colourful fish with hydrophytes enhance the beauty of the park. There is an amphitheatre where cultural programs are hosted. Facility for the modern acupressure track is also installed near the entrance for the morning walkers.

**Janeshwar Mishra Park:** An urban park situated in Vikas Khand, Gomti Nagar. It was established in the memory of late Samajwadi stalwart, Janeshwar Mishra. The park was inaugurated on August 5, 2014, which is the largest park in an area 150 ha in Asia. Very tall statue of Janeshwar Mishra has been installed in the park. There is a cycle track, amphitheatre, children park, water bodies with boating facilities.


Lucknow has only 5.66 percent forest cover, which is much less the State average of 8.00 percent forest cover. For increasing the forest cover, Forest dept. should construct Mini Forests in the Capital with dense plantation adopting the Miyawaki technology. Miyawakii a Japanese forester, who developed this technology at the age of 90 years.


While increasing the green cover, Lucknow Municipal Corporation and Lucknow Development Authority should establish more parks in all the localities. Residents of the colony should adopt these parks for the proper supervision and maintenance Let us join the campaign with the Clean and Green Environmental Society for saving the heritage parks and gardens as well as the senile trees of Lucknow.

**Dr. S.C. Sharma**
Former Director Grade Scientist
CSIR-National Botanical Research Institute, Lucknow
E-mail: scshrmagardener@gmail.com

**Mrs. Parvati Sharma**
Horticulturist, Plants Clinic,
2/111 Vishwas Khand, Gomti Nagar, Lucknow-226 010
E-maii: parvatiscsharma @gmail.com

## Vertical Gardens for Improving Home Environment

**Prerna Mitra**

With the shortage of space, and trend of nucleated families, the spacious gardens in large independent houses has paved way to flats and small houses.

There are no spread-out farms or gardens, kitchen gardens left for plantation. Therefore Vertical gardens at homes are scenically common

Vertical gardens make their room on a vertical surface without much maintenance of ground and soil. This method of growing crops in a controlled indoor environment, has the potential to change agriculture on small and large scales

There was a time when climber plants had the advantage to increase the beauty of home walls but now the hardcore gardening buffs have found a way around this space crunch. Traditionally beans and squashes, climbing plants were used by building trellises.

### Innovative Vertical Gardens

A step further, the nonclimbing plants also gets space on the wall. New trends has made an entry to decorate vertical surfaces, which keeps the home makers busy or structure like wooden fibre posts , frames of PVC pipes , old box pallets and plastic or tin cans

Bottles and other store room materials can also be used to contain the beautiful plants

If we are in love with plants as we are, we have probably often thought about how gorgeous our home might be with full of them. There are other ideas of creating mini gardens at home which also includes a mini aquaponic Tower gardens and ladder plant

Other ideas for vertical garden are: Basket Vertical garden, Shoe bag plantation and Gumboots plantation

We can grow veggies and herbs fruits without much hassles on any framed structures. As it requires less time and there is no harm animals cause to the vertical garden plants



### Important Plants for Interiors

Five important Interior plants grown on vertical gardens, that improves health They are useful for the home environment:

1. *Aloe Vera*, succulent plant that purifies the air, has amazing healing properties, usually suggested to be kept in the kitchen window sill where it can soak up the light and also be available to soothe any kitchen burns.
2. *Sanseveria* or snake plant improves quality of air , and needs very less water and brings in positive energy.
3. Spider plants that quietly battles common environmental toxins ncluding carbon monoxide and xylene.
4. Boston fern with air purifying quality, helps to restore moisture to the air naturally. They look stylish if hung around home in macramé hangers. It is needed by attentive and style conscious house owners.
5. Peace Lily gives an aesthetic feeling. It combats harmful household chemicals, including benzene known as carcinogen.

### Medicated Vertical Plants

- Other suggested varieties to be grown at home for basically shallow rooted variety for vertical garden are as follows:
- Song of India, besides being air purifier, it cures malaria and any kind of poisoning.
- Sword Fern removes harmful toxins.
- Begonia cures bronchitis and digestive disorders etc.
- Purple heart serves as an air purifier.
- Croton cures gall bladder colic and malaria problems.
- Asparagus includes fibre, folate and vitamins A C K.
- Besides these plants veggies fruits and herbs completes the food requirement at home any time when needed

### Advantages

During this unprecedented time, we all have the best opportunity to make our homes beautiful with our family and with healthy green surroundings within the limited space

There is no doubt about this fact that vertical gardens improves the home environment with plants up and off the ground. It all depends on the individual's interest and creation to add fervor to their routine.Vertical gardening requires less maintenance .This type of gardening is most productive and flexible gardening system. There is a purifying and healthy air circulation in all corners of the house as It absorbs the pollutants and harmful air, thus making the home environment clean and healthy.The green cover on the walls and buildings facilitates insulation from heat, air pollution and noise. Temperature gets regulated with cooling and shed area. It keeps the home makers engaged in decorating their homes Not only this, in our schools schedule of Online classes, children are being motivated to do gardening at home thereby keeping them engaged . Even parents are being motivated to follow their interest and passion and nothing better than spending time amidst the natural beauty at home. Making the best use of our time away from the busy schedule of webinars, online teaching and other engagements, small amount of time spend with our home garden, gives solace to our mind and heart.The more we are amidst nature and admire them the more comfortable and healthy we feel. It enhances the interior and exterior looks of the homes. In today' s situation, when the economy has adversely impacted everyone, we need to find peace and serenity and house plants are our best companions and assets.Most important, It increases our happiness quotient. Therefore, with vertical green walls we need to make our homes happy and healthy. In the words of Leo Tolstoy "*One of the first conditions of happiness is that the link between Man and Nature shall not be Broken"*. Therefore, let us keep our strong bonding with nature in the best possible manner as the earth is what we all have in common.

**Dr. Prerna Mitra**
Principal, Army Public School, S P Marg,
Lucknow

## Green Building for Sustainable Environment

**Sumer Agarwal**

### What is a Green Buildings?

Green building focuses on increasing the efficiency of resource use- energy, water and materials while reducing building impact on human health and the environment during the building's lifecycle, through better design, construction, operation and maintenance. Green Buildings should be designed and operated to reduce the overall impact of the built environment on its surroundings.

### Why Green?

We are steering into an era of unprecedented public and private sector development significant environment costs. This massive increase in use of environment resources has

brought us towards, unpredictable environment. The time has come where we can no longer ignore the benefits of green building practices that have a major impact on our environment

**Why Green Buildings?**

- Our planets faces challenges- especially climate change and sustainable economic development which are global in nature and so we need global solutions.
- The building sector, which consumes as much as 40% of the world's energy, 12% of its water and contributes 40% of the waste sent to landfill, is a major part of a global problem.
- However, the building sector can be even a bigger part of this solution
- As we live in one world, we have a collective responsibility to work together to achieve change around the globe and especially in India.
- An international research confirms that green buildings consume less energy, less water and generate less waste, and create a healthy and productive environment for employee as well as common people.
- Green building practices can reduce the building's operating cost by as much as 9%. Increase building values by 7.5% and realizes 6.6% increase in return on the investment.
- Green Building do not just sense too.

Some of the other benefits of having **Green Building** are:

1. Some of the lighting/energy consumption is met through renewable energy such as Solar.
2. Increased property values and decreased infrastructure strain.
3. Increased employee attendance as well as productivity.
4. Sales improvement- studies show better sales in stores that utilize natural light.
5. Improved Schools- leads to significant reductions in student absenteeism.
6. Improved health makes healthier lifestyles and recreation.

**How to Achieve Sustainability?**

In today's era lot of development are going on in public as well as private sectors due to rapids urbanization. The rapid pace of development has resulted in the use of scare resources, which are having the major impact on our environment.

We need to design our buildings in such a way that they should be closer to preserving the greenery and self-sufficient in the use of energy, watered material bring together the wisdom of traditional architecture and modern technology to create a sustainable future.

The building need to be designed on the principle of **"What gets measured, gets managed",** because then only we will be able to know how much we are helping in reserving the environment.The construction needs to be done in a manner, which utilizes all the resources efficiently. Sustainability lies in the approach to designing, construction and operation relating to large developments. Township and other residential and commercial buildings. The building needs to be designed in a manner, which is resources efficient throughout the life-cycle of the building.Some of the important factors, which should be looked into while constructing green building, are:

- Building should be designed in such a way that they make the least impact on the environment, response to the climate of the area and appropriate care is taken to preserve the environment while the construction is being undertaken.
- Suitable health and safety conditions of worker on site, improving energy efficiency of the building, and ensuring proper waste management during construction and operation.
- We also need to have a rating system, which suits our country's needs that will help us in the design and evaluation for green building and habitat by which the environment performance of building can be evaluated based on certain quantitative and qualitative norms thereby providing standard criteria of green building and habitats. This criterion will try to reduce resources consumption, waste generation and over all ecological and environmental impact of the building and habitats.

**What is GRIHA?**

- **GRIHA:** (Green Rated for Integrated Habitat Assessment) council is India's own rating system for Green Buildings. It is developed on the Indian ethics and facilities stream lining sustainability in the built environment in India.
- What is needed is to create awareness in the mind of the designers, builders architects/consultants and various other department about the advantages of having green building for sustaining the environment.
- In order to enable ad equip the building professionals needs to create Green Buildings and Sustainable habitat, the GRIHA way for professionals in the construction industry is the need of the hour.
- We all know that green building movement is one of a strategy to reduce our impact on the Mother Nature due to the unchecked development architectures. Let us join the mission with GRIHA- our national rating system and help develop India as one of the greatest and sustainable places to live for both our future generations and us.

**Benefits of Adopting- GRIHA**

- 30-50% reduction in energy consumption.
- Enhances transparency through web-based portal.
- 5-30% of lighting energy consumption or its equivalent met through renewable energy.
- 40-65% reduction in building water consumption.
- Outdoor lighting on renewable energy.

Apart from all this, the Principal Industry Specialist, Green Building, IFC Climate Business Group and the founder of EDGE; certification system to resource- efficient buildings; have shared these thoughts and ideas about the future of Green Buildings in India as well as globally.

*"Miracles do not happen in contribution to nature but only to that which is known to nature."*

- The technically device set up for the first time, allows an optimal management of the water consumption, optimizing the natural light and offers an upper wellbeing to the real estate buildings.

- All these architectural high-end technologies not only enable the reduction of energy consumption but also increase savings to the owners.
  *"More than 12 lac trees every year are required to feed the infill needs of over 100 lac doors each year."*
- Windows are an important element in passive solar home design, which uses solar energy at the site to provide heating, cooling, and lighting for a house.
- The Vaastu Shastra was evolved keeping in view the influence of the Sun and Earth's magnetic fields on the living beings on the Earth.
- Vaastu Shastra, therefore, worked out the sun rays to the inmates of a house.

Lucknow (the City of Nawabs) also has been chosen amongst other cities to develop as the Smart City in Uttar Pradesh (India). blocks of a Smart City, which can be directly influenced by architects/engineers and designers.
With the abundance of talent that we have in our country, our thinkers and professionals will address the core issues and come out with meaningful suggestions, capable of practical application that will be worthy of emulation by others.
*"Green building are essential to the planet's survival."*

**Er. Sumer Agarwal**
Chairman, LEVANA Group, Lucknow

## Healthy Environment Leads to Healthy and Positive Life

**Rashmi Soni**

Environment includes all the conditions in which we live and work. Our psycho-social environment is the interaction of the various sources of stress in our lives and how we respond to them, both individually and as communities. Our environment includes both social determinants of health and physical environmental determinants of health. Environment can influence people's behaviour and motivation to act. The world we live in is full of negative vibrations. The food we eat, the water we drink, the air we breathe is full of negative vibrations of our personalities. If we want a happy and positive environment for our , youth and senior citizens, we need to develop a positive and compassionate approach in life.

The concept of ECG helps us understand this. Just like a stable ECG denotes a state of death of a person, similarly in life also no problem, no challenge is like a stable ECG. Problems and challenges in life give a meaning to life and is a sign of life rather than death. But in psychological terms ECG denotes a totally different connotation and if we learn to accept this ECG, this world and environment will be a better place to live in.

E stands for EMPATHY. It is the ability to understand the feelings and emotions of oneself and others. The term "empathy" is used to describe a wide range of experiences. Emotion researchers generally define empathy as the ability to sense other people's emotions, coupled with the ability to imagine what someone else might be thinking or feeling.

Contemporary researchers often differentiate between two types of empathy: "Affective empathy" refers to the sensations and feelings we get in response to others' emotions; this can include mirroring what that person is feeling, or just feeling stressed when we detect another's fear or anxiety. "Cognitive empathy," sometimes called "perspective taking," refers to our ability to identify and understand other people's emotions.

When you see another person suffering, you might be able to instantly envision yourself in the other person's place and feel sympathy for what they are going through.While people are generally pretty well-attuned to their own feelings and emotions, getting into someone else's head can be a bit more difficult. The ability to feel empathy allows people to "walk a mile in another's shoes," so to speak. It permits people to understand the emotions that others are feeling. For many, seeing another person in pain and responding with indifference or even outright hostility seems utterly incomprehensible. But the fact that some people do respond in such a way clearly demonstrates that empathy is not necessarily a universal response to the suffering of others.

Having a great deal of empathy makes you concerned for the well-being and happiness of others. It also means, however, that you can sometimes get overwhelmed, burned out, or even over stimulated from always thinking about other people's emotions.

C stands for COMPASSION. It is sensitivity with action."Compassion is not the doing of charitable acts or social reform; it is free from sentiment, romanticism and emotional enthusiasm. It is as strong as death. It is like a great rock, immovable in the midst of confusion, misery and anxiety. Without this compassion no new culture or society can come into being. Compassion and intelligence walk together; they are not separate. Compassion acts through intelligence. It can never act through the intellect. Compassion is the essence of the wholeness of life." (Cited from the book 'The Whole Movement of Life Is Learning' by J. Krishnamurti ).

Compassion literally means "to suffer together". Among emotion researchers, it is defined as the feeling that arises when you are confronted with another's suffering and feel motivated to relieve that suffering. Compassion is not the same as empathy or altruism, though the concepts are related. While empathy refers more generally to our ability to take the perspective of and feel the emotions of another person, compassion is when those feelings and thoughts include the desire to help. Altruism, in turn, is the kind, selfless behavior often prompted by feelings of compassion, though one can feel compassion without acting on it, and altruism isn't always motivated by

compassion. Compassion gives us the ability to understand someone else's situation and the desire to take action to improve their lives. For people who are dependent on others for help and support, Compassion is often the most important factor in allowing them to lead fulfilling lives.

There are three steps to build Compassion:

i. **Serenity:** It is emotional regulation by accepting the facts without getting overwhelmed.
ii. **Courage:** It is most needed despite being vulnerable and in distress
iii. **Wisdom:** Knowing when to act and when to accept the situation. Doing nothing is wisdom too.

**G stands for GRATITUDE.** Grateful people benefit psychologically in several important areas of daily life. These include greater personal wellbeing, such as happiness, optimism and vitality, closer relations with other people; a stronger sense of connection to all life, and less concern with material possessions. What are you most thankful for in your life? How often do you feel grateful, and how easy is it for you to express gratitude? It's not surprising that such questions are vital to the new field of positive psychology, for gratitude has been a valued emotion in diverse cultures throughout human history.

### Guided Activities

The more that you can bring gratitude into your daily life, there is greater likelihood of increasing your happiness and well-being. Here are five effective ways to do so:

1) **Make a gratitude list.** Once a week for the next four weeks, find time to identify in writing everything in your life for which you're grateful. Certainly your list can include family members, friends, co-workers, neighbours, and other people, as well as aspects of your health, livelihood, and personal skills, talents, and interests.
2) **Keep a gratitude journal.** Each night before you go to sleep, write about an event of that day for which you're grateful. It needn't be something big and dramatic. For example, if your commute to work, or your wait in line at the post office, took less time than you expected, that's something to be thankful about. The important thing is to write on a daily basis and thereby strengthen your 'gratitude muscles'. This practice will be more powerful if you set aside a particular time for your journaling.
3) **Write a gratitude letter to a relative.** If married, write it to your spouse. If single, write it to a parent or sibling. Your letter can convey broad, general feelings, but should also be specific, that is, recount at least one event within the past month. For example, "I'm thankful for the time and advice you gave me last week about the problem I was having with my boss at work."
4) **Write a gratitude letter to a friend.** Even with close friends, we sometimes get overwhelmed with our busy schedules and fail to acknowledge their importance in our life. Don't let this happen to you. Everyone likes to be thanked for their attentiveness, companionship, and concern. Select a close friend and send a personal, handwritten letter expressing gratitude.
5) **Make a vow to practice gratitude.** Research shows that promising to perform a behavior increases the likelihood that it will be done. Therefore, write your own gratitude vow, which could be as simple as "I promise to count my blessings each day," and post it somewhere easily visible in your home.

Thus, to wrap up if we can follow and apply this ECG formula in our daily living not only we will be positive and healthy but at the same time it will be possible to keep our environment safe, healthy and positive which is the need of the hour.

**Dr. Rashmi Soni**
HOD, Department of Education
Sri J.N.P.G. College, University of Lucknow, Lucknow

## Role of Biochar in Sustainable Agriculture

**Deepak Pandey, Sudhir Shukla and Ram Pratap Singh**

The technique for discovery of biochar was first described by Spanish explorer Francisco de Orellana in the 1540s (where biochar is known as terra preta). Biochar is nothing but carbon rich charcoal-like substance which is created by heating biomass (organic matter) in a limited oxygen conditions, a process known as pyrolysis. The pyrolysis have industrial perspectives for judicious utilization of agro-waste by optimizing the conditions as per the desirable products viz., liquid, solid (char or biochar), or gas production. Thermo-chemical decomposition in pyrolysis converts biomass into a network of carbonates and aromatic compounds. Soil contains 3.3 times more carbon than atmosphere and 4.5 times more than plants and animals. Lignocellulosic waste of woods, crops and their co-products, problematic weeds, aquatic plants/weeds, municipal and animal wastes, are nowadays considered as a potential source of renewable energy production through the process of pyrolysis. Several organic wastes are being used for production of biochar through pyrolysis at a temperature between 300 °C and 800 °C. India is the second-largest agrarian economy and generates a large amount of crop residues, including 500 MT/year of crop residues. The primary plant nutrient, nitrogen is essential for plant growth mainly nourished with synthetic fertilizers. These synthetic nitrogen fertilizers are prone to high N losses as leaching, volatilization and nitrous oxide emissions. These losses collectively cause low nitrogen use efficiency (NUE), higher production costs and environmental pollution, more specifically greenhouse gas (GHG) emission. It is commonly defined as charred organic matter, deliberately applied to soils to sequester carbon and improve soils physical, chemical and biological properties. Incorporation of biochar to soil increases the $NH_4^+$ adsorption subsequently decrease nitrification which in

turns conquer the discharge of H+ concentration to the soil and relieve soil acidification. Biochar application in soil has received a growing interest as a sustainable technology to improve highly weathered or degraded soils. It guarantees a long term benefit for soil fertility and productivity. It can enhance plant growth by improving soil physical properties (i.e. bulk density, water holding capacity, infiltration, porosity), soil chemical properties (i.e. pH, nutrient retention, nutrient availability), and soil biological properties (i.e. microbial biomass carbon and enzyme activity), all contributing to an increased crop productivity. The major quality of biochar that makes it attractive as a soil amendment is its highly porous structure which is responsible for improved water retention and increased soil surface area.

## By-product of Biochar

One of the great things about producing biochar through the process of pyrolysis is the fact that the main by-product is a gas, known as syngas which is a form of bio energy waiting to be used. It is easily captured and can be used to produce heat and power, to generate electricity as well as power the pyrolysis machine in the process, making the machine largely self sufficient.

**Table 1. Fate of initial feedstock mass between products of pyrolysis processes**

| Process | Liquid (bio-oil%) | Solid (biochar %) | Gas (syngas%) |
|---|---|---|---|
| **Fast pyrolysis:** Moderate temperature (?500$^0$C), short hot vapor residence time (<2 s) | 75% (25% water) | **12** | **13** |
| **Intermediate pyrolysis:** Low-moderate temperature, moderate hot vapour residence time | 50% (50% water) | **25** | **25** |
| **Slow pyrolysis:** Low-moderate temperature, long residence time | 30% (70% water) | **35** | **35** |
| **Gasification:** High temperature (>800$^0$C), long vapour residence time | 5% tar (5% water) | **10** | **85** |

## Benefits of Biochar in Sustainable Agriculture

The potential benefits that biochar offers for farming includes:

1. Improved soil fertility and crop yields.
2. Increases soil pH and thus reducing the need for lime, enhances nutrient availability for plants.
3. Improved water retention, aeration and soil tilth.
4. Reduces dependency on fertilizers, reduces bioavailability of heavy metals.
5. Higher cation exchange capacity and less nutrient runoff.
6. Increase the microbial activity.
7. Clean and efficient biomass energy production from crop residues and forest debris.
8. Leads to net sequestration of carbon from the atmosphere to the soil thereby increasing soil organic carbon (SOC).
9. Decreased nitrous oxide and methane emissions from soils.
10. Can work as component of reforestation and afforestation efforts and can produce electricity, bio-oils, and/or hydrogen fuels.
11. Can use wide variety of feedstock including crop residues such as wheat and corn straw, poultry litter, cow manure, forest debris, and other farm-based biomass resources.
12. Net production of energy in form of bio energy.


The benefits of biochar applied as an effective adsorbent for wastewater treatment

## Application Rate and Methods

Recommended application rate for any soil amendment must be based on extensive field testing. In general, biochar materials can differ widely in their characteristics (e.g. pH, ash content) which in turn influences application rate. Several studies have reported positive effects of biochar application at the rate 5-50 tonnes per hectare (0.5-5.0 kg/m2) on crop yields, with appropriate nutrient management.

Biochar should ideally be applied near the soil surface in the root zone, where the bulk of nutrient cycling and uptake by plants take place. Certain systems may benefit from the application of biochar in layers below the root zone, for example during landscaping for C sequestration or if using biochar for moisture management. Similarly, if biochar were to be applied to soil solely for C sequestration purposes, placement deeper in the soil would be desirable since microbial activity that can degrade biochar carbon is reduced. The different application methods are as follows:

- Broadcasting.
- Traditional banding.
- Mixing biochar with other solid amendments.
- Mixing biochar with liquid manures.

However, method of biochar application in soil mainly depends on farming system, labour and available machinery. Generally farmers apply biochar in their own field by hand only. But due to prolonged contact with airborne biochar particulates, it is not viable on large-scale considering human health. Broadcasting application needs large amount to cover whole field. Suitable method of application deposits biochar directly into the rhizosphere, and may be viable for perennial cropping systems, and previously established crops. Banding allows biochar to be placed inside the soil while minimizing soil disturbance, making it possible to apply biochar after crop establishment. Mixing biochar with other soil amendments such as manure, compost or lime before soil application can improve efficiency by reducing the number of field operations required. Biochar can also be mixed with liquid manures and applied as slurry. Fine biochars will likely be

best suited to this type of application using existing application equipment, and dust problems associated with these would be addressed. Mixing of biochar with composts, manures and other organic input may reduce odours, colour and improve nutrient performance over time due to slower leaching rates. Mixtures may be applied for uniform topsoil mixing without incorporation.

### Frequency of application

Due to its recalcitrance nature, single application of biochar can provide beneficial effects over several growing seasons in the field. Therefore, biochar does not need to be applied with each crop, as is usually the case for manures, compost, and synthetic fertilizers. Depending on the target application rate, the availability of the biochar supply, and the soil management system, biochar amendments can be applied in increments.

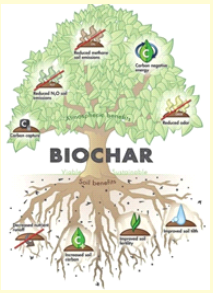
### Limitations in Using Biochar

In general, there also remains a lack of knowledge and awareness of bioenergy and carbon markets, how to access these markets and particularly a way to accurately evaluate costs and benefits associated with the use of biochar in soil. If biochar is not properly made, it can pollute soils with compounds, such as PAHs (polycyclic aromatic hydrocarbons), dioxins (toxic heterocyclic hydrocarbons), furans (cyclic flammable liquid compounds), heavy metals (metals or metalloids that present environmental problems), etc. and also poses threat to ecosystem, being carcinogenic. This would include the levels of arsenic, cadmium, lead, chromium, manganese, mercury, nickel, vanadium, etc. There might be other sources of pollution, which would depend on the substrate that was used to make the biochar. It is important to use pure lignocellulosic biomass, without plastic or rubber contaminants.

### Future Line of Work

- Low cost biochar pyrolysis equipments.
- Municipal solid waste disposal through biochar production.
- Standardization of biochar based nutrient fortification and nutrient releasing pattern.
- Optimization of biochar application for different agricultural crops.
- Long term carbon sequestration potential of biochar in different ecosystem.
- Acid soil reclamation capability of biochar.
- Biochar induced microbial dynamics and its role in nutrient availability.
- Biochar induced systemic resistance in plant disease and pest control.

### Climate Smart Solution



**Soil and atmospheric benefits of biochar**

Global warming can be debated, but the increase in atmospheric CO2 levels is clearly measured. The earth is very capable of existing with much higher CO2 levels, but current human society probably can not. The only current reasonable method for human action to remove significant amounts of atmospheric CO2 is through biochar for carbon sequestration. The carbon in biochar resists degradation and can hold carbon in soils for hundreds to thousands of years. Biochar and bioenergy coproduction can help combat global climate change by displacing fossil fuel use and by sequestering carbon in stable soil carbon pools. It may also reduce emissions of nitrous oxide.

### Conclusion

Biochar has very promising potential for the further development of sustainable agriculture production systems. Also, biochar production provides a great potential for worldwide climate change mitigation that goes beyond its uses in agricultural production alone. It also makes soil cleaner and healthier through decontamination effect. Promotes better CO2 absorption through improved crop stand and helps in C sequestration.

**Deepak Pandey[1], Sudhir Shukla[2] and Ram Pratap Singh[3]**
[1]CBG Ag. PG College BKT, Lucknow,
[2]IISR, Lucknow, [3]ANDUAT, Kumarganj, Ayodhya

## Biofertilizers for Sustainable Agriculture

**Priya Mishra and Naveen Kumar Arora**

### Introduction

In India green revolution (GR) was introduced by Prof. M. S. Swaminathan in the 1960s. Under the green revolution program, high yield varieties of wheat and rice were cultivated. Apart from sowing high yield seed varieties, a huge amount of chemical fertilizers and pesticides were also intentionally used for agricultural intensification during GR. In the beginning, GR was persuaded as a meaningful way to enhance agricultural yield especially in attaining India's target of self-reliance in food production. Later it was also realized that the intense use of synthetic chemical fertilizers in GR was directly involved in decreasing fertility of the soil (Tilman 1998). Data indicates that from then to now, no advancements have been made in the direction of sustainable use of chemical fertilizers. For instance, according to the report of the Union Ministry of Chemical and Fertilizer, from 1950 to 1951, Indian farmers had used only seven lakh tons of chemical fertilizer, which has now increased up to 310 lakh tons. The heavy usage of chemical fertilizers has increased agricultural productivity but it has also adversely affected the environment. The overuse of chemical fertilizers disturbs the nutrient cycle, cause soil erosion, affect microbial diversity, increased soil alkalinity, increase a load of chemical pollutants in water bodies and marine ecosystems. Some reports indicated that in many states where high input agriculture practices (including fertilizers and pesticides) are more common, a large fraction of agricultural land has become barren.

**Table 1. Some commonly used microorganisms being used as biofertilizers**

| Microorganisms | | PGP Activities | Crops |
|---|---|---|---|
| Bacteria | Rhizobia (*Mesorhizobium, Bradyrhizobium, Allorhizobium* etc.) | Biological Nitrogen fixation (BNF), P solubilization, Siderophores production, Phytohormones production (Indole acetic acid (IAA) production, Gibberellic acid (GA) production, etc) | Leguminous crops |
| | *Bacillus* spp. (*Bacillus subtilis*, *Bacillus amyloliquefaciens, Bacillus thuringiensis (Bt),Bacillus licheniformis,* etc) | P solubilization, Zn solubilization, Potassium solubilization, Siderophores production, Phytohormones production, | Wheat, Maize, Rice, Mustard, Lettuce, Tomato, etc. |
| | *Pseudomonas* spp. (*Pseudomonas fluorescens, Pseudomonas syringae, Pseudomonas putida, Pseudomonas stutzeri,)* | Nitrogen fixation, P, K and Zn solubilization, siderophores production, phytohormones production | Rice, Wheat, Maize, Mung bean, Groundnut, Cotton, Tomato, etc. |
| | *Enterobacter* spp. (*Enterobacterasburiae* , *Enterobacter radicincitans, Enterobacter cloacae, Enterobacter arachidis, etc* ) | P solubilization, siderophores, IAA, and ammonia production | Sugarcane, Wheat, Rice, maize, etc. |
| | Cyanobacteria (*Anabaena* spp., *Azospirillum* spp., *Nostoc*spp., *Oscillatoria* spp., *Pseudoanabaena* spp. etc) | Nitrogen fixation, P, K and Zn solubilization | Wheat, Rice, Maize, etc. |
| Fungi | *Trichoderma* spp. (*Trichoderma. harziunum, Trichoderma viride, Trichoderma asperellum, Trichoderma. reesei, Trichoderma tomentosum* etc.) | N fixation, P and K solubilization, Phytohormone production (IAA, GA). | Tomato, Cotton, lettuce, cabbage, wheat, rice, maize etc. |
| | *Penicillium* spp. (*P. citrinum,P. radicum,P. oxalicum, P. simplicissimum* etc.) | GA production, P solubilization and mobilization. | Wheat, maize, soybean, rice etc. |
| | *Aspergillus* spp. (*Aspergillus niger,Aspergillus fumigatus, Aspergillus flavus* ) | GA production, P solubilization and mobilization | Tomato, Groundnut, wheat,soybean, sunflower etc. |
| | AMF (*Glomus mosseae, Glomus intraradices, G. claroideum, Glomus fasciculatum* etc.) | N fixation, P, K, Zn solubilization, phytohormone production, | Maize, soybean, citrus, tomato, pigeon pea etc. |

The use of beneficial plant-microbe interactions in the form of biofertilizers have emerged as a sustainable and greener approach to leverage the huge demands of synthetic chemicals in agriculture. Biofertilizers are living formulations consisting of beneficial microorganisms applicable on seeds, seedlings, plant roots, or soil which help to increase fertility and yield of agro-ecosystems. These biological products can also help in improving the quality of soil by increasing the organic matter and combating the abiotic stresses (Singh et al. 2019).Biofertilizers contain viable cells of microorganisms that can help plant in many ways (Figure 1). Biofertilizers not only promote the growth of the plant but also improve soil healthparaments such as texture, porosity water holding capacity, and soil microflora. Research indicates that the use of biofertilizers can cut down the dependency on chemical fertilizers of nitrogen (N), phosphorous (P), potassium (K) by up to 50% in many crops (Thilagar et al. 2016).Apart from this, in the era of climate change, demand for sustainable agriculture production has also raised and shifting towards organic agriculture could help in mitigating anthropogenic causes of global warming.

## Types of Biofertilizers

There are many types of microbes that are commercially produced in the form of biofertilizers (Table 1.)However, on a historical time scale, the first biofertilizer which was commercially produced was 'Nitragin' in 1895. Nitragin was prepared through a live culture of rhizobiaby Nobbe and Hiltner (1893). In India, field studies on Rhizobium-based nitrogen were also performed during early twentieth century, however, commercial level production started in 1950s. Currently, several types of beneficial soil microorganisms have been identified that can be formulated in the form of commercial biofertilizers. Microbe-based biofertilizers can be used for 1) providing nitrogen. 2) mineralizing insoluble form of P, zinc (Zn), and K. 3) help in the uptake of iron (Fe). 4) exogenous supply of plant hormones and 5) inducting plant immune system.

## Bacterial Biofertilizers

Root colonizing soil bacteria also known as plant growth promoting rhizobacteria (PGPR) are recognized for their plant growth enhancing abilities. Due to their beneficial activities, these remain a choice of interest for the development of bacterial biofertilizers. PGPR that are commonly used as biofertilizers mainly belong to genera Bacillus, Pseudomonas, Rhizobium, Bradyrhizobium, Azotobacter, Azospirillum, Klebsiella, Enterobacterand Burkholderia. Many types of bacterialbiofertilizers have been developed and are used to supply plant's demand for nitrogen (N), providing mineral uptake such as Fe, P, Zn and K through various mechanisms. Amajor fraction of bacterial biofertilizers belong to nitrogen fixingcategory and governed by root nodulating symbiotic nitrogen-fixing bacteria of the family Rhizobiaceae. In the case of rhizobia biofertilizers, mono-inoculation, co-inoculation, or multistraininoculation are also being used (Arora et al. 2014). While in the non-leguminous symbiotic association, Frankia sp. is the only genus that can fix nitrogen Apart from associative and non-associative nitrogen-fixing bacteria, free-living nitrogen fixers such as Azotobacter, Pseudomonas, Bacillus, Clostridium, and Klebsiella are also used as bacterial biofertilizers. Besides nitrogen fixers, phosphate solubilizing bacteria (PSB) based biofertilizers are also marketed at large numbers. PSB can solubilize insoluble form of phosphatic minerals such as tricalcium, dicalcium, and orthophosphate via secretion of organic

acids in to plant usable form ie. phosphate. The best-known genera of PSB are Bacillus,Pseudomonas, Azotobacter, andAcetobacter.In the last few years research showed that many PGPR can assist in enhancing the bioavailability of micronutrient to plants. In this direction, remarkable success is achieved for enhancing uptake of Fe K, Zn, Selenium (Se) via the application of PGPR in the form of biofertilizers.

**Fungal Biofertilizers**

Fungi are the most versatile group of microorganisms which colonize a wide range of environmental habitats and are responsible for c nutrient cycling and decomposition of organic matters. From the perspective of biofertilizer application, plant growth promoting fungi (PGPF) have gained wide attention. These are one of the best candidates amongst all types of biofertilizers that can be used to enhancing nutrient uptake in plants especially P and Fe. Apart from this, they can also improve soil health by improving porosity, water uptake texture, and binding of soil particles. PGPF are also known to maintain C:N ratio in soil by decomposing plant residues. A large number of beneficial soil fungi such as Trichoderma, Aspergillus, Chaetomium,Fusarium, Mucor, Ovularopsis, Tritirachium, andCandidaare being used as biofertilizers.

Amongst fungal biofertilizers, most of the work has been done in the development of Mycorrhiza based products. Mycorrhiza are known for their symbiotic association with plants that help in facilitating the uptake of P, N, Zn, copper (Cu), Fe, sulfur (S), and boron (B).Two types of mycorrhiza 1) arbuscular mycorrhizae (AM) and 2) ectomycorrhizae (ECM)are used as biofertilizers. The AM fungi are considered natural biofertilizers, since they provide the host with water, nutrients, and pathogen protection, in exchange for photosynthetic products in nearly 80% plant species. In addition to an improved nutritional supply, AM interactions provide other benefits to plants, such as improved drought and salinity tolerance. Although AMF are potentially involved in overall health improvement of the plant, their production in the form of bioformulation faces some constraints. For instance, as AMF are obligate symbionts and cannot be cultivated in pure cultures, large-scale production of their biofertilizers is very challenging and complex.

**Compost**

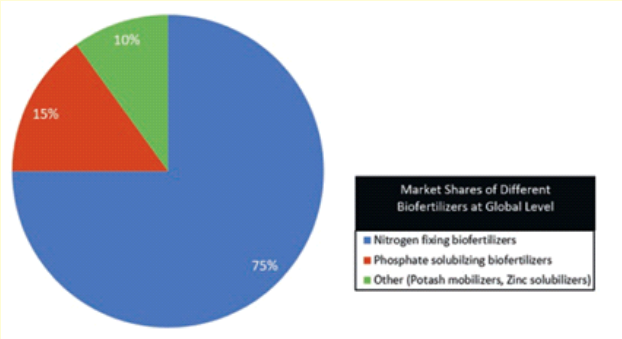
Compost is made of waste biodegradable material whether it is agricultural waste or waste from the kitchen or garden. In composting the waste is degraded in a stepwise manner. composting takes around 60-90 days to complete during which temperature can increase up to 600C and pH shifts from 7.6 to 7.3. Changes in pH and temperature affect the microflora concentration that causes high decomposition of waste into compost. Apart from temperature and pH, the level of moisture, ash content, and C:N ratio should also be maintained to acquirea good quality of compost. The consortia of microorganisms associated with compost have plant growth promoting activity and act as good soil conditioner that can improve plant growth and enrich the soil. Enriched compost contain different bacteria and fungi such as cellulolytic fungi (Chaetomium sp., Humicolasp. Aspergillussp., and Fusariumsp.), mesophilic organic acid-producing bacteria (Bacillus sp. Lactobacillus sp.) used for moderate-temperature phase, which lasts for a couple of days. Thermophilic microbes such as Actinomycetes (Actinobifidachromogena, Microbispora, Thermopolysporabispora, Therinomnonosporacurvata, Thermoactinomyces sp.), Bacillus sp. are involved in high-temperature phase. This phase lasts from a few days to months, followed by a several-month cooling and maturation phase. The final compost product is used as a soil conditioner which contains microbes thatimprove the soil biodiversity, soil organic content and help the plant to grow better. Additionally, different microbes are being used to enrich compost products to enhance the desirable property in the soil as well as plants.

**Biofertilizer Market**

The biofertilizer market is also expanding very fast. For instance, according to the Markets and Market business survey, it is estimated that the biofertilizers market could reach at USD 2.3 billion by the end of 2020 and it is projected to reach USD 3.9 billion by 2025, with calculated annual growth rate(CAGR) of 11.6% during the forecasted period. The market is driven primarily by the increasing organic farmland as well as the rising acceptance of biofertilizers among farmers.In India,total fertilizer (chemical and biofertilizers) market was worth Rs 4,675 billion in 2017 which is projected to reach Rs 9,987 billion by 2023, at a CAGR of around 13%. Market survey and research indicates that in contrary to biofertilizers, chemical fertilizers dominate and hold the largest share in the market, however, biofertilizers are also moving up the ladder. Some of the global market players developing biofertilizers for various crop typesare Novozymes (Denmark), Rizobacter Argentina S.A (Argentina), Symborg (Spain), Lallemand Inc. (Canada), China Bio-Fertilizer Group, China and Mapleton Agribiotech (Australia). Indian companies include T Stanes& Company Ltd. (India), SOM Phytopharma (India) Ltd. (India), International Panaacea Limited (India), KanBiosys (India), Madras Fertilizers Limited (India), Gujarat State Fertilizers & Chemicals Ltd. (India), National Fertilizers Limited (India)etc.

**Constraints in Biofertilizers**

Despite greener and eco-friendlier alternatives to chemical fertilizers, biofertilizers are not used as mainstream fertilizers in agro-industry. There are some constraints that biofertilizer industries are consistently facing. Biofertilizer products have a limited shelf-life and run a high risk of contamination. Additionally, it has been also observed that microorganisms used in the preparation of biofertilizers are often lost or diminish their activity in field conditions. Long term storage with desired viability of selected microbial strains in biofertilizer is also a challenge. Other challenges revolve around several parameters such as culture medium, physiological state of the microorganisms when harvested,




dehydration process, rate of drying, temperature maintenance during storage, and water activity of inoculants. These challenges influence the shelf-life of microbes. Apart from these some socioeconomic factors are also responsible. For instance, farmers show reluctance towards biofertilizers in underdeveloped and developing countries which is creating a challenge for the biofertilizers market. They prefer using chemical fertilizers, as they are easy to handle. This can be attributed to a lack of training and information. Furthermore, the established nature of the chemical fertilizers market is also one of the reasons for the slow adoption of biofertilizers, as conventional fertilizer companies hold a wide range of product offerings and have a strong distribution network. These constraints should be removed and both public and government sectors should come forward to popularize and promote these greener and sustainable alternatives to chemicals fertilizers.

## References

Arora, N. K., Verma, M., & Mishra, J. (2017). Rhizobial bioformulations: past, present and future. In Rhizotrophs: Plant growth promotion to bioremediation (pp. 69-99). Springer, Singapore.

Nobbe, F., &Hiltner, L. (1893). Impfet den Boden. Sächsische Land wirtschaftliche Zeitschrift, 16, 1-5.

Singh, M., Singh, D., Gupta, A., Pandey, K.D., Singh, P.K., and Kumar, A. (2019). "Chapter Three - Plant Growth Promoting Rhizobacteria: Application in Biofertilizers and Biocontrol of Phytopathogens," in PGPR Amelioration in Sustainable Agriculture, eds. A.K. Singh, A. Kumar & P.K. Singh. Woodhead Publishing), 41-66.

Thilagar, G., Bagyaraj, D. J., & Rao, M. S. (2016). Selected microbial consortia developed for chilly reduces application of chemical fertilizers by 50% under field conditions. Scientia Horticulturae, 198, 27-35.

Tilman, D. (1998). The greening of the green revolution. Nature, 396(6708), 211-212.

**Priya Mishra and Prof. Naveen Kumar Arora**
Department of Environmental Science,
Babasaheb Bhimrao Ambedkar University,
Lucknow, UP, India

# Scenario of Ground Water Extraction in Lucknow City

**R.S. Sinha**

In Lucknow city, though the river Gomti has been the prominent source for drinking water supplies, but with growing urbanization and rising population, the dependency on ground water has increased manifold to meet the escalated water supply demand. That is evident from the data of Jal Sansthan's tubewells which shows that tube wells have significantly increased from 45 in 1975 to 630 in 2019. As per the present estimates, about 45% of municipal water supplies in the city are dependent on ground water. Beside this committed supply, ground water is also being largely exploited to meet the ever-increasing demands of housing, institutional, infrastructural, industrial, commercial and other sectors operating in this capital city of the state.

| Year | 1975 | 1985 | 2005 | 2009 | 2019 |
|---|---|---|---|---|---|
| Growing Tubewells (nos.) | 45 | 70 | 300 | 490 | 630 |
| Reducing Yields (LPM) | < ---------- 1200-1500 ---------- | | | | |
| Increasing withdrawals (MLD) | 50---- | 600- | 1100 ---- | 300-- | >390 |

However, about 400 MLD of water supply is being provided by the Gomti river and also the Kathauta Jheel which gets water from Sharda Sahayak Canal. In Jal Sansthan's water supply zone 1 to 4 and 6 & 7, supplies are augmented from both Gomti/Kathauta Jheel and tubewells, while w/s zone 5 & 8 as well as Vikas Nagar area are totally tubewell fed.

## Depleting Ground Water:

- As a result of large-scale exploitation, ground water is rapidly depleting with water levels reaching to unsustainable stage.
- For the larger part of the city, ground water levels are mostly declining at a rate of 70cm to more than 1.0 m per year in the localities of Mahanagar, Aliganj, Gomti Nagar, Indiranagar, New Hyderabad, Lalbagh, Cantt., Hazratganj, Alambagh, Vrindavan colony and various other areas.
- The tubewell yields have also reduced significantly from 1200 LPM to about 700 LPM in a span of 20-30 years, mainly due to decreased aquifer storage as a result of excessive exploitation.
- Other Concerns:
- As most of the city area is paved and further the continuous deficit in monsoon rainfall especially during the last 2 decades has impacted ground water recharge and its availability that has, to some extent, added to widespread ground water depletion in the city. As per IMD data, average annual rainfall recorded between 2011-2018 for district Lucknow is 733 mm against normal rainfall of 963 mm showing a deficit of 24%.
- The granularity of aquifers in Lucknow city is mostly dominated by fine sand and this is the reason the aquifers have relatively low yield and reduced recharge capacity, thereby affecting ground water resource potential and its

storage.

- At various places, deeper extraction may encounter poor quality(saline)water, as granular zones with marginally deteriorated/poor quality water were demarcated at depths.

**Ground Water Extraction- A Tentative Assessment:**

The situation is very alarming and since natural recharge is also not happening due to a completely transformed concrete urban environment, the heavy pumping has led to extreme damage to ground water regime of the city and the situation has reached to almost an irreversible stage. The reason being that the private tubewell construction activity has almost mushroomed in the city causing extensive extraction and subsequent decline in ground water levels. The concern is that the top aquifers (< 100 mbgl) have almost gone dry and we have started exploiting Static Resource (Future Reserve) of ground water beyond 150-200 m depth and even deeper. As a consequence, a 'Trough' has developed within the city, which is an alarm for a potential risk to the sustainability of Lucknow's eco system.

Since we do not have any scientific methodology dedicated to assess the ground water availability in urban centers, the declining ground water levels are the only tool to measure the impact of large-scale extraction. The piezometers/ ground water monitoring stations, installed in Lucknow city way back in 2007, are the only device presently available to monitor ground water levels and to assess the extent of ground water depletion.

A tentative assessment has been made to find out an overview of Ground Water Extraction within the city, as given in the following table and that clearly indicates that out of total projected extraction of 1215 MLD, only 390 MLD is extracted by Jal Sansthan's w/s tube wells and the rest of abstraction i.e. about 825 MLD is from other sources, which are not accounted so far by any agency.

In this Table, the figures of tubewells and respective ground water withdrawals are assumed on the basis of pattern of growth of housing, institutional, infrastructural, commercial sectors and also the prevailing pattern of water usage within the city limits. However, the given figures need further validation through sector wise pilot surveys to come-out with more accurate and authentic data on ground water extraction.

**Impact:** The impact of above extraction is clearly visible on the ground water levels, being depleted all across the entire Lucknow city.

Some critical observations

- In 1970's, the pre-monsoon depth to water table in Lucknow city was less than 10 mbgl for the most part, which was even shallower along the flood plain Gomti.
- With continuous large-scale withdrawals, at present the ground water table has depleted widely beyond the depth of 20 mbgl and even crossed much deeper levels i.e. 30m bgl or more in some areas, including Lalbagh, Cantt., HAL, Indira Nagar, Alambagh, Jail Road, Puraniya.
- A comparative study shows that the ground water zone of 8-15 mbgl was covering 132 sq km area of the city in pre-monsoon, 2006, but in a span of 10 years i.e. in pre-monsoon, 2015, it has reduced to 63.6 sq.km, while in the same period, the ground water zone of 25-35 mbgl has increased from 62.5 to 101.4 sq.km. and the zone beyond >35 mbgl has also expanded from 2.9 to 34.3 sq.km between 2006-2015, i.e. more than 10 times. It is anticipated that by presently, these deeper ground water zones might have further expanded/ increased to critical levels, due to continuous and unabated declining water level trend.
- The above data clearly suggests that with continuous indiscriminate extraction, ground water levels are going down much deeper to almost unsustainable level, which seems difficult to be reversed to normal level in present situation.
- The scenario is quite alarming as, the granular zones of dynamic/top aquifers are expected to have lost some 2800 billion litre of ground water during last 10-12 years.

**Gomti lost Seepage/Inflows from Ground Water:**

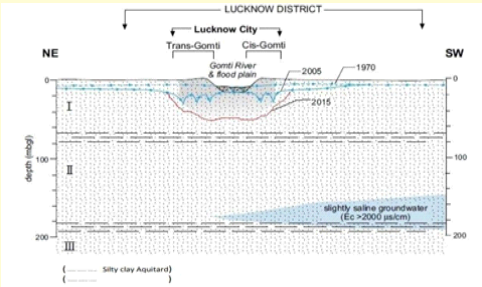
Gomti is known as ground water fed river (Gaining stream), but during last 3-4 decades due to excessive exploitation in Gomti basin, ground water levels have gone down drastically and this has impacted natural inflows of ground water to Gomti. As a result, stream flows (e-flows) of Gomti

**Decline in Ground Water Levels in Lucknow City (Some Locations)**

| Sl No | Location of Piezometer | Ground Water Level (mbgl) | | Decline (m) Pre 2006 – Pre 2019 | |
|---|---|---|---|---|---|
| | | Pre 2006 | Pre 2019 | Total | Per Year |
| 1 | Mahanagar, Post Office | 24.5 | 39.1 | 14.6 | 1.12 |
| 2 | Faizulahganj | 8.93 | 29.71 | 20.78 | 1.6 |
| 3 | Remote Sensing Application Center, Kursi Rd | 15.1 | 26.06 | 10.96 | 0.84 |
| 4 | LDA Lal Bagh | 30.29 | 40.43 | 10.14 | 0.78 |
| 5 | Victoria Park, Chowk | 18.19 | 27.75 | 9.56 | 0.73 |
| 6 | Airport, Amausi | 14.85 | 20.38 | 5.53 | 0.42 |
| | | Pre 2014 | Pre 2019 | Pre 2014 - Pre 2019 | |
| 1 | Gomti Nagar, Viram Khand | 19.7 | 27.8 | 8.1 | 1.62 |
| 2 | Indira Nagar | 26.15 | 35.25 | 9.1 | 1.82 |
| 3 | Walmi, Vrindavan Colony | 14.2 | 22.4 | 8.2 | 1.64 |

| Institution/Activities Water | Tubewells (nos.) | Tentative Ground Water Extraction (MLD) |
|---|---|---|
| Lucknow Jal Sansthan | **630** | **390** |
| Railways & Govt. Establishments (Central & State)* | **350** | **120** |
| Multistoried Flats/Apartment, private residential colonies. * | **500** | **280** |
| Commercial establishments, Hotels, Hospital, Malls.* | **210** | **100** |
| Tankers, Bottling Units, Water Parks. * | **----** | **25** |
| Industries * | **90** | **35** |
| Construction Activities. * | **----** | **15** |
| Submersible Domestic Borings * | **1 Lakh** | **250** |
| (* GW withdrawals which are unaccounted) | | Total: 1215 MLD |

have reduced appreciably, as it is not getting inflows from ground water resource which has extensively depleted. This is very much visible in Lucknow city, as depicted in the following sectional view.




Trough is gradually increasing

**(a) Alarming facts:**

- Due to rapid depletion, Ground Water Trough has already developed within the Lucknow city and as a result, interaction between river Gomti and ground water regime has broken.

**(b) Drying up of granular zone**

- There is a possible threat that such situation along with some lithological characteristic changes may lead to events like land-subsidence/cracks.
- Studies by Mr. B.B. Trivedi, ex-scientist, CGWB conclude that as a result of drying up of the ground water zones causing loss of elasticity in the dried-up granular zone, followed by drying of the succeeding clay layer. Such clay layers in due course of time are likely to become plastic.
- The reason being that the prevailing elasticity on account of both the surface tension and the adhesive forces between formation grains and water molecules has vanished. The plasticity is more at locations underlying relatively thicker and also more finer clays. By virtue of finer grains, the inter grain distance become very less leading to increase in plastic character. As a result, heavy rains would increase the weight i.e. pressure of rainwater in the inter mediate zone of aeration leading to probabilities of surface cracks as elastic change in volume of formation would become negligible.

**Impact of Roof Top Rain Water Harvesting Structures:**

Installation of Roof Top rain water harvesting and recharge structures in government and private buildings has been mandated since year 2001 and subsequently various directions issued by the Housing and Urban Planning Department have been issued from time to time. As per available information, in more than 200 government buildings and number of new private buildings (constructed on plot size 300 sq.m or more) as well as in residential complexes and multistoried buildings, roof top recharging structures are reported to have been installed.

- However, any impact of these recharge structures on ground water has not been monitored/assessed and it is also not visible on continuously depleting ground water levels.
- Further, due to lack of regular maintenance, a large number of recharge structures are reportedly not properly functional, thus hindering the recharging process to the maximum.

**Solution and Needful Interventions:**

A well thought and meaningful plan for City Ground Water Management through efficient interventions is urgently needed for implementation to overcome the crisis of ground water depletion in Lucknow city.

**(a) Need to identify ground water usages:**

Lucknow city is divided into a network of 8 water supply zones with Vikasnagar as independent supply region, but the pattern of ground water extraction and its usages are different in these water supply zones. Besides drinking water supplies, all supply zones are also abstracting and using ground water for commercial, industrial, infrastructural and other activities. Hence, it becomes important to identify the realistic quantum of ground water abstraction and its usages in all the major user sectors, so that zone wise management plans could be suitably prepared for execution.

**(b) Action/Interventions:**

**Reduce extraction effectively:** Immediate regulatory interventions are needed in all the user sectors for effective reduction in present rate of ground water extraction, as the resource is in a critical state. For reduction in existing ground water withdrawals, some robust and strict measures need to be urgently taken up to bring down the present level of abstraction by at least 40%. That would certainly give respite to the depleted aquifers and they might subsequently rejuvenate with increase in resource potential and improvement/rise in ground water levels.

- **Develop Peri Urban Well Fields:** As a policy action, the urgent need is to shift existing Ground Water based

drinking water supply programme to peri urban areas Lucknow-Sitapur Road, Chinhat area) where prolific aquifers are delineated for constructing high yielding deeper tubewells to augment sustainable supplies to city. In continuation, the existing tube wells should also be phased out to give respite to depleted aquifers of the city. This way, the water levels would also recover in a period of time.

- Systematic and planned implementation of Roof Top Rain Water Harvesting should cover all the houses in the city through simple and low-cost feasible methods in order to capture maximum rain water as much as possible for subsequent sub surface percolation.
- Combined Recharge System, mandated by housing department for new housing schemes since year 2006, if effectively enforced, would be a potential source for ground water recharge/rain water harvesting.
- The citizens need to be motivated for ground water conservation through effective social communicators and local level workshops.
- Keeping lawns kaccha could be a good option for allowing natural percolation of rain water and hopefully with this small effort, the city would be able to capture a huge amount of rain water for indirect recharge in a natural process.
- Possibilities of pavement storm water harvesting need to be explored for execution. This a very potential option for ground water recharge. The concrete/tiled pavements should be redesigned for more natural percolation as per the local hydrogeological feasibility that would prove to be a promising method for large scale natural recharging. It is expected that a redesigned pavement of 100 x 2m size with more space for natural percolation may recharge some 10000 to 12000 litre of monsoon run-off into subsurface strata by adding up to soil moisture and subsequently augmenting ground water sources also. If such practice is adopted in entire city, a huge amount of storm water could be suitably recharged through the natural process.
- Further, feasible locations for storm water storages through reservoirs, ponds, recharge basins should also be identified for storing surplus monsoon run-off.
- Water efficient methods such as recycling and reuse of extracted water should be mandated and enforced for institutional, housing and commercial establishments.

**R.S. Sinha**
Former Senior Hydrogeologist
Ground Water Department, U.P.
E-Mail: r.s.sinha11@gmail.com

## Organic Amendments in Management of Soil Borne Plant Diseases

**Yogendra Kumar Singh**

Plants are evolved with their own defence against plant pathogens through their biomolecules. When organic amendments are applied in the crop fields, these biomolecules are released into the soil and stimulate the activity of microbes which are antagonistic to plant pathogens thereby reducing the activity of phytopathogens in the soil. In the begining it was believed that organic amendments are commonly used to improve the nutrient quality of the soil, but off late it was proved that organic amendments can be used in plant disease management, particularly in soil borne diseases. Soil amendment with organics controls the disease by killing the pathogens in the soil thus protecting the present crop and reducing the inoculum for the future crops. It has been demonstrated that organic amendments are used to control many soil borne plant diseases caused by viruses, bacteria, fungi and nematodes. Organic amendments are found effective in suppressing soil borne diseases such as damping-off and root-rots caused by *Pythium ultimum, Rhizoctonia solani, Phytopthora* spp., and wilts caused by *Fusarium* spp. and *Verticillium dahliae*.

Composts and manures derived from the processing of plant and animal parts have been in use as crop nutrient source since the beginning of agriculture. Early fertilizers and fungicides were cheap, powerful and easy to transport in bulk. Better, quick and consistent results given by these chemicals, made them widely popular and increased their demand. Artificial, synthetic fertilizers and copper fungicide had been created during 18$^{th}$ century, initially with superphosphates and then the ammonia derived fertilizers were produced in mass during World War I by Haber Bosch process (Horne andAnthony, 2008). So 1960's has been called as 'pesticide era' (Horne and Anthony, 2008). Widespread use of such chemicals initially gave encouraging results by boosting agricultural production world over. But within a few decades their drawbacks became apparent by appearance of environmental and human health problems.

Organic movement began a few decades back as a reaction to agriculture's growing reliance on synthetic fertilizers and chemicals. Organic biochemicals are environment friendly, easily biodegradable and safe for humans. Organics thus are capable of restoring ecological balance if become popular. Therefore, there is a need to go back to traditional methods of farming. During the past two decades, considerable progress has been made in restoring cultural practices in agriculture. Though, composts are in use as plant nutrient source since centuries, their use in plant disease control is recent. It is generally known to agriculturists since a long time that the use of organic compost in field produces healthier plants with reduced disease incidence but this area has recently received focus of research and has been on fast-track since then.

The role of organic amendments in plant disease management has long been suspected but has recently been established by scientific research. Wilhelm (1951) showed

that the use of blood meal and fish meal totally reduced the incidence of *Verticillium* wilt of tomato. The nursery industry first observed that composted tree bark seemed to suppress *Phytophthora* root rots (Ceuster and Hoitink, 1999). Such observations opened a new area of possibilities of formulating organic composts of special composition, tailored for control of particular diseases. Since then there has been much documentation of data regarding the control of certain diseases with specific composts.

The killing of microsclerotia of *Verticillium dahliae* was achieved in test tube microcosms by meat and bone meal amendments of soil (Tenuta and Lazarovits,2002). The control of cucumber Fusarium wilt was achieved by the application of pig manure and rape seed bio-organic fertilizer in field plots (Zhang et al., 2008). The control of snap bean common root rots (*Aphanomyces euteiches*) was achieved in field conditions by the use of fresh paper and composted paper amendments (Leon et al.,2008). The control of *Pythium* spp. on cucumber was achieved in pot experiments by the use of different composts (Fuchs and Larbi, 2009). The suppression of white pumpkin *Rhizoctonia* damping off was achieved in plastic trays by the use of vermicompost (Rivera et al., 2010). The reduction of potato scab, *Verticillium* wilt and nematodes was achieved by the use of soymeal, meat and bone meal amendments in field plots (Lazarovits et al.,2010).

The traditional Indian medicinal plant neem (*Azadirachta indica*) has now been established by research to possess broad spectrum antimicrobial properties. Neem based products used as soil amendments, have been found to be effective against nematodes in numerous reports. Beneficial effects of application of oil seed cakes of neem, castor, mustard and duan on management of parasitic nematode like *Meloidogyne incognita, Rotylanchulus reniformis* and *Tylenchorhynchus brassicae* and pathogenic fungi like *Fusarium oxysporum f. ciceri, Macrophomina phaseolina* and *Rhizoctonia solani* have been demonstrated in field conditions (Tiyagi and Alam, 1996). Management of *M. incognita* infesting *Vigna radiata* and *Cicer arietinum* in preliminary trials (in ice cream cups), green house trials (earthen pots) and field trials (micro plots of size 0.1 sq. mt.) was reported by the use of crop-seed treatment with dried powdered neem seed and soaking of crop-seeds in aqueous extracts of neem cake, neem seed kernel and seed coat (Majumdar and Mishra, 1996). Suppression of tobacco damping off (*Pythium aphanidermatum*) was reported in green house micro plots (sized 0.5 sq. m.) and nursery conditions by neem based products used for the pre-sowing soil treatment in the form of cakes and soil drench (Shenoi et al., 1996). Amendments have also been used for yield enhancement, control of weed, pests and soil borne diseases. Beneficial effects of *Parthenium hysterophorus* compost on soil nutrients, yield of soybean and cow pea, control of weeds and pests (stem borer and leaf roller) in rice fields has also been reported (Ramaswami, 1997). Suppression of *Phytophthora* spp., *Fusarium* spp. and *Septoria* spp. in tomato fields was achieved by use of nine different composts derived from wastes and by products of olive oil, wine and mushroom agro-industry (Ntougias et al., 2008).

Neem based extract formulations have also been found to be effective against pests and other foliar pathogens like fungi, bacteria and viruses. Management of pest and diseases of cotton (*Aphis gossypii, Bemisia tabaci*) and soybean (*Aproaerema modicelli,* Yellow mosaic virus) was reported by spraying of neem based products (Vidya et al.,1998). Management of rice pests (*Cnaphalocrocis medinalis, Nilaparvata lugens*) and diseases (sheath blight by *Rhizoctonia solani*) was achieved by neem cake application to nursery soil and neem seed kernel extract, neem oil spraying on field plants (Ouerdraogo et al., 2001). Reduction of rice bacterial blight (*Xanthomonas compestris* - oryzae) was demonstrated in field conditions by spray of plant extracts like neem cake extract (5 %), neem seed kernel extract (2 %), *Prosopis* spp. leaf extract (10%), *Acacia* spp., Plantomycin (500 ppm), Plantomycin (1000ppm) and *Bacillus subtilis* suspension (Eswaramurthy et al., 2004). Efficacy of neem based extracts and other products for management of root rots of *Elettaria cardamomum* caused by *Rhizoctonia solani* and *Phytophthora meadii* was reported under in vitro conditions (culture plates), green house conditions (pot experiments) and field conditions (Dhanpal et al., 2004). Soil application of Melia azedarach controlled the Meloidogyne incognita in cucumber (Cavoski et al., 2012). Nematicidal effect of four neem formulations such as neem seed powder (NSP), organic, watery and essential oil extracts. The NSP killed all nematodes at lowest concentration (10µg/ml) after 48 hr (Kosma et al., 2014).

Drawbacks often held against organic composts, despite the demonstrated benefits, are that, the results are inconsistent, transportation costs of bulky composts are high and their low shelf-life. Inconsistency of results has been due to inconsistency in composition and preparation practices adopted by farmers. Standardization of composition and preparation methods for local soil and climate conditions will solve this problem. To reduce transportation cost, the bulky portion of compost, i.e., cattle dung manure may be prepared separately from the minor additive i.e., plant biomass amendment. Cattle dung manure may be prepared by farmers in their own backyard in the compost pit. It would remove the need of transportation of bulky manure. Plant biomass amendments with fine tuned composition may be marketed. The cattle dung manure should be taken out of the pit just before maturation and mixed with plant additive to produce the final tailored compost. It is done, so that it can be applied to the field 30 days before sowing, to allow leaching of some biochemicals and colonization of soil by compost microbes. The maturation will take place in the field itself. To increase the shelf-life of marketed compost, addition of dried and powdered plant biomass to the cattle dung manure was tested for efficacy. There are some reports of successful dry biomass addition to the soil, without composting, for control of diseases. Fritz (2007)

reported that rape seed powder application to field furrows controlled pea root rot (*Aphanomyces euteiches*). Similarly, soymeal, meat and bone meal application controlled potato scab, potato *Verticillium* wilt and nematodes as reported by Lazarovits et al. (2008). Suppressive effects of dried plant residues from *Brassica rapa, Arachis hypogaea, Trifolium pratense* against sugar beat damping off (*R. solani*) at 1 per cent (w/w) rate was reported by Kasuya et al. (2009), by the mechanism of promotion of soil antagonists.

Critics, including father of 'Green Revolution' N.E. Borlaug claim that organic farming cannot feed the world population (Quinones et al., 1997; Trewavas, 2001; Trewavas, 2004). Further, some studies also claim that organic farms yield is lower than that of conventional farming (Maeder et al., 2002; Badgley et al., 2007). So, the answer lies in making least possible use of inorganic chemicals and methods. The central idea behind writing this review is to enthuse the reader to develop cultural methods which are cheap, environment friendly, safe for human and animal health, which do not require much technical expertise to apply and can even be developed further by farmers themselves in the working conditions, away from hi-tech lab facilities.

**Dr. Yogendra Kumar Singh**
HoD, Plant Pathology
C.B. Gupta Agriculture P.G. College,
BKT, Lucknow-226201.

## Mushroom- Proven Food for Human Nutrition

**A.K. Srivastava**

Mushrooms have been known since an ancient time and is being used as alternate food to the non-vegetarian. Mushrooms have been recognized as the alternate source of good quality of protein (20-35%) and also contain no starch, low fat, low calories and good vitamins (folic acid, thiamine, and niacin) vitamin D, minerals (potassium phosphorus zinc copper and sodium) which are higher than found in vegetables and fruits. In addition, many mushrooms possess naturally multi-functional medicinal properties like anti-cancerous, anti-fungal, anti-bacterial, ant- tumorous, anti-viral activity and many other disease. Recently, Ministry of Education, Department of School Education and Literacy, Government of India advised mushroom based supplement recipe should be added in mid day meal scheme in villages, which remove the bridge of protein gap.

Nutrition is the most important subject for humankind. A balanced nutrition is particularly important from the point of taking in essential elements such as minerals, vitamins and high quality proteins. Nutritional values of foods play an important role in human health. The people have to provide a balance diet containing essential food compounds; amino acids, fatty acids, minerals and vitamins. A sufficient and balanced diet should also include taking in enough carbohydrate and energy supplies. Mushrooms can provide balancing diet compounds in sufficient quantities for human nutrition, and contain medicinal compounds. A number of edible and medicinal mushrooms heve been known. Cultivated mushrooms have become popular, and over 200 genera of macrofungi are useful for the people in the world. Most of them are cultivated on lignocelluloses waste materials and contribute to their re-cycling. The common mushroom species produced in suitable ecological conditions are: Agaricus spp. (button)., Lentinulaedodes (shiitake), Calocybe (milky), Pleurotus spp. (oyster), Volvariellavolvacea (paddy straw), Lion's head or pompom (Hericium), Auricularia (ear), Cordyceps, Ganoderma (Reishi), Grifolafrondosa (maitake), Winter (Flammulina), white jelly (Tremella), Pholiota (nameko), and shaggy mane (Coprinus). The most common ones produced are Agaricus bisporus (button) mushroom, Lentinulaedodes, and Pleurotus species. The nutritional and chemical composition, and physical properties of edible mushrooms have been studied by different authors .It is well know that mushrooms have a rich chemical composition and functional properties for health.

**A. K. Srivastava**
Department of Plant Pathology
Chandra Bhanu Gupta Agriculture PG College
Lucknow (Uttar Pradesh)
ashu.srivastav20@gmailcom

# News, Views and Feedback

## Australian Forest Fire and Loss of Biodiversity: My Own Experiences

**R.C. Chaudhary**

During December to February months in India, while it snows in the mountains and people shiver in the plains; Australian hot summer temperature touches 46 °C. There is no rain but dry heat. Australians put cotton on bushes to mimic European winter for celebrating Christmas and New Year. Many Australian go overseas to visit relatives and for tourism. Likewise, from Northern Hemisphere, people flock in Australian cities and coasts to get away from the freezing winter. Those months, also synchronize with the harvesting of field and fruit crops. During such a lovely season, I and my whole family including my wife, daughters, daughter - in - law, son and grand sons were enjoying Australian summer during December, 2019 and January, 2020. For us it was tempting to enjoy orchards and fruits of cherry, apricot, apple, grapes etc.

Print and electronic media were flaring one news "Australian Forests on Fire". While the forest fires were limited to Northeast and Easter part of Australia, we were

feeling safer in Melbourne. It was short-lived, as we could watch flora and fauna disappearing in ashes. Trees could not move but panic -stricken and sometimes half-burnt animals could be seen running for life. Slower moving animals had the worst time as their charred bodies went into smoke. It was pitiable scene but what could we do when Federal Government of Australia herself was so slow to move. Fire was uncontrollable and engulfing major forested and inhabited area. BBC telecasted satellites photographs of Australia where the business capital of the country, Sydney, was invisible due to heavy smoke and flying ash above it. "Kangaroo Island", located beyond the east coast of Australia became devoid of Kangaroo, as 100% of the animals had no escape. That was very and still is very heart touching for us. Later, I gathered that 3 billion vertebrates, 451 human being and 5,960 buildings were destroyed by the time fire could be extinguished. NASA estimated that 306 million tons of carbon dioxide was emitted in the atmosphere escalating global warming and damaging environment. Domestic and international flights had to divert their routes while flying over Northern and Eastern Australia including Queensland. It was recorded as the worst fire of Australia that burnt 18,630 square kilometre area of Australia. One can imagine the loss to flora and fauna and that way biodiversity of Australia, which is so unique to the world. One may recollect that the plant species like gum tree (Eucalyptus, Corymbia), Banksia, Bird's Nest Fern, Flame pea, Grass tree, Kangaroo paw, Oryza australiensis etc. Among fauna Kangaroo, Koala bear, Ostrich, Kiwi, Wallabies, Tasmanian Devil, Dingo, Marsupiales, Platypus etc are so unique, to Australia. Loss to these is loss forever to the world. Anything lost may be recovered but not the biodiversity.

Several million years ago when Australia separated from Gondwana supercontinent, those flora and fauna were never repeated on African, or Indian subcontinent. Therefore, the total loss to this unique flora and fauna would have been colossal. The smoke that was visible to satellite was also visible from several South African and Latin American countries. Unusual and occasional rain showers could not extinguish the fire. Australian government itself did not take the incidence seriously in the beginning and the celebration of Christmas and New Year went on full swing. In Melbourne, me and my whole family of 12 people joined the celebration in Melbourne with the locals, having no idea of the tune of disaster of biodiversity on 31st December, 2019 and 1st January, 2020 night.

Neighbouring countries like Japan, Indonesia, Malaysia, Philippines and several others sent their relief teams, fire fighters and fire fighting aircraft to help Australia. Dozens of people were blamed and arrested for starting the fire innocently or knowingly while making picnic. In New South Wales, alone 183 people were arrested among which 24 people were charged for igniting fire. In Queensland 70% of the people arrested for starting fire were juvenile. Many had difficult family background and some of them admitted that they wanted to see how devastating the small fire they started could become. On this issue serious attention needs to be paid by the Federal and State Governments of Australia. The dry heat, dry grass, crop residue, dry forest etc was also blamed for the fire. Thunder and lightning came as God's curse in such a situation. The actual cause may or may not be known, but forest fires are annual affairs, though on much smaller scale in Australia. However, reasons must be found to contain the annual occurrences. The cry of the flora cannot be heard as they can't run and die silently but of fauna is hard to forget. Baby animals rescued cry for their burns and their mothers' milk. Those stuck and charred could only be counted by their skeletal remains. More than 30% of unique Koala Bears became extinct after this biggest Forest Fire of Australia.

It is hard to imagine how many people shared these information and have their three minute prayer for the loss of biodiversity including human life and wealth. In India we definitely displayed the essence of Vasudhaiv Kutumbkam (The World a Family) and observed three minutes of silence at 9.00 PM on 8th January, 2020. The Forest Fire of 2019 - 2020 in Australia recorded as the world's Most Devastating forest fire of the century is extinguished now but it will take years for the loss of flora and fauna (Biodiversity) to recover.


**Mantra for the peace & biodiversity**

**Dr. R.C. Chaudhary**
Chairman PRDF, 59N Canal Road,
Shivpur Shahbazganj, Gorakhpur 273014,
Mob. 9450966091, Email: ram.chaudhary@gmail.com

## Experiences During Covid-19 Pandemic Lockdown

**S.C. Sharma and Yogesh K. Sharma**

About ten months before, life was quite normal, suddenly COVID-19 became the Global Topic. On 11 March 2020, the World Health Organization (WHO) declared severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2, previously not identified in human) as a pandemic that causes novel coronavirus disease 2019 (COVID-19). Presently, spread over at least 213 countries causing unprecedented loss of lives and the toll still continuing to rise. Phylogenetic studies suggest that SARS-CoV-2 might have emerged from the zoonotic cycle and rapidly spread by human to human transmission. Corona virus is an animal borne and the Bat (Chiroptera spp.), a four legged

flying mammal is suspected for spreading the virus. COVID-19 started from the live animal market, Wuhan (P.R China). However, the exact source of SARS-CoV-2 is yet to be identified. Transmission among humans occurs via close contact with an infected individual that produces respiratory droplets while coughing or sneezing within a range of about 2 m. Group of Corona viruses belong to the family Coronaviridae, infecting humans along with other species, and are respiratory illness causing viruses. The first encounter with the CoV was seen in 1960s, which was named as HCoV-OC43 and HCoVs 229E. Till now six such groups of CoVs are known: HCoVOC43, HCoV-HKU1, HCoV-229E, SARS-CoV, HCoV-NL63, and MERS-CoV. SARS-CoV-2 is a single-stranded RNA virus of about 30 kb genome size.

Central and State Governments issued advisory for wearing masks, social distancing, frequent hand washing and staying at home. Flights, trains, buses and even the metro drives all were cancelled. Offices, schools, temples and all type of celebrations were closed. Life became very boring to staying home with the family members 24 hours seven days a week. We are party men and used to go to the clubs and restaurants, malls and multiplex at least once a week with our family members and friends. Domestic workers also stopped coming home for helping the house wives. Even we were asked to share responsibilities in the household affairs with clear cut Division of Labour, and we were assigned difficult jobs. By chance anybody pressed the call bell, we had to rush wearing the mask and keeping two meter distance for opening the main gate. Earlier we were having academic and social get-togethers frequently with friends and relatives. Now rarely anybody was visiting our home. America says that China is responsible for spreading the Covid-19 from the Wuhan animal market while China totally denies the allegation. We do not know the truth and start blaming Dr. Trdos Adhanom Ghebreyesus, Director General, WHO for keeping the iron curtain on the facts. Due to Spanish flu, which is a deadly influenza, 30-100 million people died world over. While in World War II, 70-85 million people perished. Corona virus became a political weapon, especially for America, where election was held on November 3, 2020. Biden the Democratic Presidential candidate says it is Trump who has failed to control the virus. All the leading countries are actively busy for developing the vaccine to controlling the virus. Even the News on social media became so harassing and making us nervous while reading newspapers and watching the TV news, first thing appears on COVID-19. Roads and streets were deserted, we were caged in our own house, while animal roaming freely on the road. Kids became restless being at home all the time. Schools and colleges started online classes for the students, which was again very boring. Outside sports were completely stopped and / or games e.g. carom board, cards, chess board were displayed in separate rooms for us, spouse and children. We do not have much interest in indoor games and are interested more in reading and gardening.

Arogya Setu app is a helpful device for detecting the infected people with COVID-19 within an area of 2 km. Commonly used nucleic acid tests are RT-qPCR and high through put sequencing, where RT-qPCR is the effective and straight forward method for detection of pathogenic viruses in respiratory secretions and blood. When the information is given on the app, we become panicky. Different types of Karahas are being advertised in newspapers for boosting the immunity in the body to fighting the Corona virus. Delicious milk tea has been stopped in the house and we are forced to take Green Tea, Karahas, Tulsi drops, Giloy powder. Baba Ram Dev says for getting up before the Sunrise and do Yoga exercises for body build up to fighting with Corona virus. Recently, there was a Breaking News, that Baba Ram Dev while demonstrating the yoga on the elephant back, suddenly slipped from the elephant and fell down. For the cruelty to the animal, a case was registered against Baba Ram Dev.

Even the vaccine is being discovered and will be distributed free, wearing mask and social distancing should continue for controlling the spread over of COVID-19. In South Korea, Thailand and Japan, it is customary to wear the mask for controlling the dust and suspended particles. In Japan average age is more because the elderly people wear masks to avoid contamination. Necessity has been highlighted all over the world for the national resilience in the context of pandemic. Virus transmission occurs mostly indoors, when exposed to an infected person for a prolonged period, and outsiders only in close proximity to the others. The science of masks distinguishes between cloth and medical masks, healthcare workers and general population, open spaces and close sittings, sick and healthy people. In hospitals, professional learn how to put on, adjust, remove, dispose and clean before and after donning a medical mask.

These days, mask has also become an essential item. In the local market, masks are available for Rs. ten to twenty only while in the global market it has become a business of trillion dollars. Certain masks are studded with silver, gold and pearls, and costing lacs in rupees. Earlier our wardrobes were displayed with the ties now it is filled with different type of masks. COVID-19 pandemic is a wake-up call that we are reaching the limits of what the planet Earth can sustain. Hats off to the Doctors, Police officials and Corona warriors for attending the patients without caring for their own lives. We are also obliged to the farmers for their untiring work to produce food grains and the vegetable and fruit vendors for coming from door to door for supplying the items of daily need. We are also grateful to our Prime Minister, Shri Narendra Modi and Shri Yogi Aditya Nath, Chief Minister, Uttar Pradesh for boosting the moral of the people in these extremely difficult days.

Indian kitchen is a Pharmacy, where all the herbal spices e.g. turmeric, coriander, cumin, cloves, fenugreek, cardamom, nigella, asafoetida, mint etc. are the essential ingredients for mixing in the vegetables and pulses. These spices help a lot for boosting the immune body system.

There is always a Tug of War between the Healthy Body System and Diseases. If the Body System is strong than it will knock down the Diseases otherwise diseases will takeover.The emergence of any infectious viral disease is difficult to anticipate, even though use of spatial epidemiology and mathematical modeling may predict the occurrence of emerging or re-emerging diseases like COVID-19. SARS-CoV-2 infection is of global public health and economic importance and therefore needs collective government and societal response.

Change is the Law of Nature and there is always a Silver line in the Dark clouds.

**Dr. S.C. Sharma,**
Vice President, CGES
**Prof. Yogesh Kumar Sharma,**
Secretary General, CGES

## Environmental Love and Acceptance: The Only Panacea to Fight Against Corona

**Uma Soni and Rashmi Soni**

Love and care for each other, care for the Mother Earth are the simplest and most valuable human qualities; and love belongs to oneness. We had never thought in our weird dreams that all of a sudden out of the blue the whole world will come under the grip of a pandemic. We had only heard from elders, read in books about epidemics, pandemics where lakhs of people died and villages were devastated. But actually witnessing such a situation and crisis in this life itself is really beyond our dreams and difficult to accept. But the reality is that now we are part of it and we are facing this crisis, fighting against it and of course living with it. How this pandemic has changed the whole course of our lives and life style is beyond our imagination. If we try to understand, the Mother Nature has expressed its anger and grief. The limits were crossed by human beings. We have been taking the nature, our mother earth too much for granted since years now. Not caring about her, not loving her, not caressing her and man had been too busy doing almost every bit of his/her uncivilized act to hurt the mother nature.

Ultimately, The Nature had to burst out and give a lesson to man and to its evil acts-whether in terms of polluting the environment, making the rivers and oceans dirty, increased corruption, violence, greed, jealousy, ego, lust, anger, attachments and of course increasing population. The Mother Nature ultimately decided to maintain its balance. At this time I always remember the Malthusian theory of population. Malthus, the renowned economists emphasized that there are only two checks to control population-positive and preventive. If man cannot take preventive checks, Mother Nature will of course take positive checks to maintain its balance and this is what it has done ultimately. And so there are epidemics, train and plane accidents, earthquakes, volcano eruptions, Tsunamis and other calamities. Lakhs of people have died all over the world due to Corona-children, youth; adults and old-nobody is left. What was their fault? I don't think any, but nature did not grant anyone. We need to understand, not only understand but also should feel the pain, the hurt that nature has gone through. Yes, the time has come and it is a final call and bell for the most intellectual species on this earth that we ultimately rise to the level of emotions from simply becoming technological and mechanical.

Man is in the process of becoming a machine, no emotions, no love, no compassion and no feelings left or almost becoming nil. We believe it or not, we have moved quite far, in fact very far from emotional connect; our relationships have become mechanical, selfish, conditional and judgemental. We have become selfish and greedy that we are least bothered not concerned at all with what the other person is going through, what he or she is feeling and thinking. Yes, the fact is that we have moved towards being apathetic. No sympathy, no empathy. That man has become apathetic is proved with increasing number of cases of rapes of minors in our country, is proved with increasing number of cases of murders, where a father brutally kills his own family members, son cuts the throat of his father, own brother. Man has crossed all limits of violence and intolerance. There is no patience, no tolerance left in man. Just a little provocation and he is ready to either take his own life or thoseof others. Is this what nature expects from such an intellectual species?

Time and again Mother Nature, our mother earth has been giving signals to human beings to introspect, to become civilized, to come back to its original and divine self and nature, to love and care its surroundings and environment. But the predicament is that man has been busy in the mad race and rat race to reach and achieve great heights constructing buildings on the emotions, relationships and feelings of his/her own people without caring for anyone. And lo! Ultimately, a day came when nature took its turn and locked each and every being not only of our country but of the whole world in one's own house. Total Lockdown! Isn't it still understood? Do we still need anything else, any other signal of this nature? The nature must have thought to itself that now it is high time that these humans in the form of demons should be locked in their own homes, totally isolated, distanced from each other so that the nature gets time to renew itself, to balance itself, to breathe freely, to get its own space. It is really a great predicament that we human beings have never understood the importance of love, compassion, care, forgiveness, persistence, patience and humility. These are all the divine qualities that a child is born with and we have it but as we grow and develop we are bound with the chains of conflicts, guilt, negativities, revenge, we forget our divine qualities and are only engaged in fulfilling our own motives.

Swami Vivekananda said, 'All love is expansion, all selfishness is contraction. Love is the only law of life.' And I think that it is the only solution for the present crisis

situation that the world is facing. In this time of isolation and social distancing, we need to come together and connect through love and care, and the power of love can serve as a balance to the darkness of fear, to the forces that can so easily grab us.

During disasters and emergencies people are affected by the stresses and challenges of these events. These stresses can sometimes be quite traumatic. In mental health terms, a crisis refers not necessarily to a traumatic situation or event, but to a person's reaction to an event. One person might be deeply affected by an event while another individual suffers little or no ill effects.

"People are in a state of crisis when they face an obstacle to important life goals—and obstacle that is, for a time, insurmountable by the use of customary methods of problem-solving." (Caplan, 1961)

Crises are stressful events for everyone who is touched by them, sometimes even when the connection is indirect or at great distances. There are performance challenges, time pressures, and high stakes risks, dangers to health, safety and well-being, and exposure to horrific circumstances – all of which result in dramatic responses in the body, brain and mind of those of us who are experiencing them. Moreover there are individual differences in how each individual is coping with this crisis situation and it depends upon the degree to which he or she is affected. Thus, a general tendency is inherently manifest in characteristic ways.

During any crisis and change, life may seem confusing and difficult. Learned coping strategies do not seem to apply and new ones have not been found yet. Even desired changes may cause anxiety and affect self-esteem in a negative way. The overall situation in life and the significance of the event causing the crisis often affect the creation and intensity of the crisis. Sometimes the changes bring back important and often painful memories. Grief and anxiety from the past may suddenly resurface and confuse the person and their loved ones. Nevertheless, crises always allow the chance to develop and become stronger. It helps in developing a better understanding of life, one's view of the world may change and one may be better prepared to face the world and challenges of life.

COVID-19 is one such crisis which has drastically moved people not only externally but also internally to a great extent. Not only the daily routine of people, their living, their choices, their life style and above all their beliefs, values, thoughts and mental states have undergone a drastic change. The Corona virus is a global threat that has triggered a health alarm worldwide. It has taken the globe by storm with numerous cases detected worldwide. The calamity which began in China's Wuhan in late 2019 is now a global health emergency. Most countries of the world were declared a total lockdown till just the month of June 2020 to mitigate the risks of the COVID-19.

There have been many implications of this lockdown. People had to stay at homes, in complete isolation, take precautions, and even the corporate sector has directed its employees to work from home. Overall the directives suggested so far are for the well-being of the people and to ensure their safety. But why does this lockdown matter? Let's demystify the reasons here. The entire nation was in the phase of complete lockdown. All shopping malls, movie theatres, temples, churches, parks, and other places of public gathering were directed to remain shut until further notice; some are still not opened completely for public. We all were directed to stay at home, take precautionary measures, maintain social distancing, and furthermore, maintain hygiene. Most of the employees of the corporate sector now are working from home and keeping themselves quarantined to halt the spread of the virus.

The lockdown has affected our lifestyle in many ways. Before moving into quarantine, we were asked to stock all necessary supplies like milk, medicines, grocery items, etc. beforehand as during the phase of lockdown, the demand for them might increase. We now have to stay isolated from friends and family and maintain social distancing from them for our and their safety. We have been advised to drink sufficient water and boost our immunity with healthy and home-cooked food, refraining from going to our favorite restaurants. This phase of lockdown definitely affected each and every one of us.

The lockdown has changed our lifestyle in many ways. It has put strict restrictions on all our preferences- what we eat, where we go, and much more. Though it is a dire need of the hour, we have become more responsible regarding maintaining hygienic habits and help others in upholding them. Since remaining in isolation is necessary, we also need to keep ourselves socially distanced from our friends and relatives. Moreover, we have also understood the importance of using protective measures like wearing a mask, washing our hands at regular intervals, etc. to save ourselves from health risks.

It's strange but the work from home culture has started and it has and is gradually making people techno savvy. Online classes of schools, colleges and university students, meetings, webinars and training programmes through various technological applications is really helping people to understand and become technology friendly. However it has many repercussions too. Many people especially women are finding it hard to draw a balance between work from home and family duties. It has overburdened them which are causing irritation and frustration in them. It has also changed the life of old people both for the good and bad; bad because they have been restricted to the four walls. Their daily routine of walking outside and meeting with their old age friends has been disturbed. And it is good because their whole family is now together, eating, talking, playing and spending time together.

Thus, this crisis in the form of pandemic has given us an opportunity to step back, to stop, to pause and see within, introspect ad reflect on our actions and reactions, our thoughts, needs and desires. We can no longer afford to pollute the earth with our ceaseless desires, filling the air with carbon emissions, the oceans with plastic. The present crisis has brought light in the form of clean air, clear sky,

clear and clean rivers and oceans, more chirping and singing of birds, expressing their happiness and of course in the form of cleanliness around us. Also it has given us a chance to improve the quality of our lives in terms of improving our relationships and our lifestyle and of course our living habits. We need to understand that the Mother Nature wants us to go back to its ways and live our lives naturally.

Now it is upon us humans what we want? It is a warning bell for the whole world to realize that this is how the earth, the world should be and we should all come together to keep it this way. We need to nurture our nature with love and care.

And this is possible by changing our attitude and mind set. Love will remind us that we are a part of life that we belong to each other and to this living, suffering planet and can together bring our world back to balance. We can emerge from this pandemic with a deeper sense of our shared humanity and our love for our common home, its mystery and wonder.

**Mrs. Uma Soni**
Vigyanpuri, Mahanagar, Lucknow
**Dr. Rashmi Soni**
HOD, Department of Education,
Sri J.N.P.G. College, University of Lucknow.
Licensed NLP & Emotional Intelligence Practitioner

## CGES Activities

### CGES Celebrated its Fifth Foundation Day

Clean and Green Environmental Society (CGES) celebrated its fifth foundation day on the virtual platform by organising a webinar on 8th July, 2020 which was joined by a large number of eminent scientists, educationists from the city and different parts of the country. Welcoming the participants the President of CGES Er. Sumer Agarwal said that the society is actively engaged in spreading knowledge about the environment, healthy living and its importance in our daily life. Secretary General, CGES Dr. S.C. Sharma presented the annual report and told that besides organising a conference on the climate change in collaboration with NBRI , CGES also contributed a token amount of Rs. one lakh donated by its members in CM relief fund in the time of Covid-19 pandemic. On this occasion, new issue of CGES Newsletter containing articles by eminent scientists and educationists and details of the activities undertaken by the society was released by chief editor Dr. A.K. Singh. Col. Ajay Gupta, IT Advisor released a Directory of CGES members of the society.

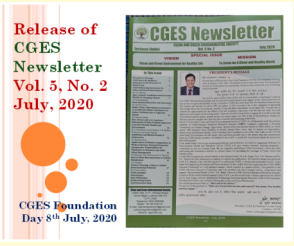
Dr. S.C. Sharma, Prof. Y.K. Sharma, Col. Ajay Gupta and Dr. A.K. Singh introduced the speakers of the webinar. In the technical session of the webinar, lectures on various important topics were delivered by the renowned experts and scientists. Dr. Amrita Dass, Founder Director, Institute of Career Studies, Lucknow spoke on the lessons learnt from Covid 19 while Prof. P.K.Seth, Former Director, CSR-IITR apprised about the effect of environment on brain. Dr. Prerna Mitra, Principal, Army Public School, Lucknow delivered her lecture on the various facets of vertical gardening and Dr. Rashmi Soni, Head Dept. of Education, JNDC, Lucknow dealt with the subject of health and positive environment and its impact on healthy life. Prof. Naveen Arora of BBAU, Lucknow proposed the vote of thanks.

**'Raksha Bandhan' With A Difference !**

On the occasion of Raksha Bandhan festival (3rd Aug., 2020) CGES members Dr. SC Sharma, Mrs. Parvati Sharma and Dr. AK Singh tied "Raksha Sutra" in plants and took pledge to save them for clean and green surroundings. Dr Sharma also presented a sapling of Harsingar to Er. NK Trivedi.

**Participation in Lucknow University Centenary Celebrations**

In the Science Festival organised during. Lucknow University Centenary celebrations (20th-24th Nov. 2020), Clean and Green Environmental Society in collaboration with Chandra Bhanu Gupta PG Agriculture Degree College, BKT, Lucknow apprised the visitors about the pollution mitigating plants (specially grown to ward off the indoor pollution) which is also hazardous to human health. Dr. S.C. Sharma delivered a lecture on this aspect. Prof. Y.K. Sharma and Dr. S.N. Pandey were also present.


## New Publication

- Lotus (*Nelumbo nucifera* Gaertn.): National Flower of India

  Authors: S. C. Sharma, A. K. Goel and Y. K. Sharma

  Publisher: Bishen Singh, Mahendra Pal Singh, Dehradun (India)

## Forthcoming Events

- Floriculture for enhancing the income of the farmers (January, 2021)
- Awareness lecture and plantation drive by CGES in schools, colleges and parks (July, 2021 onwards)
- Sixth Foundation Day of CGES (8th July, 2021)

## Honour & Award

Prof. Ashok Sahni

Prof. Ashok Sahni, Professor Emeritus, Panjab University, Chandigarh and Advisor, CGES was conferred Life Time Excellence Award 2020 by the Ministry of Earth Sciences, Government of India in view of his outstanding contributions in the fields of geology, vertebrate paleaontology and biostratigraphy. The Award carries an award of Rs. 5 lakhs and a citation. CGES congratulates Prof. Sahni for this Life Time Excellence Award and wishes him all the best for his future endeavours.

## Our Banker

भारतीय स्टेट बैंक
State Bank of India
हर भारतीय का बैंक
THE BANKER TO EVERY INDIAN

## CGES Executive Body

**President**
Er. Sumer Agarwal

**Vice Presidents**
Dr. S.C. Sharma
Er. M.S. Gulati
Prof. Rana Pratap Singh

**Secretary General**
Prof. Yogesh Kumar Sharma

**Secretaries**
Col. Ajay Gupta
Dr. R.D.Tripathi
Prof. Naveen Arora

**Treasurer**
Dr. S.N. Pandey

**Executive Councillors**
Dr. A.K. Singh
Dr. Virendra Nath
Prof. S.P. Trivedi
Dr. Tariq Husain
Dr. Priyanka Agnihotri
Dr. V.P. Sharma
Dr. Seema Ghate
Dr. Prerna Mitra
Dr. Rashmi Soni
Mr. Tilak Basu
Er. N.K.Trivedi
Mr. Vasant Pusalkar
Dr. R.C. Chaudhury
Er. M.L .Sharma
Dr. Sanjay Dwivedi

**Advisors**
Pdama Shri Dr. Mansoor Hasan
Padma Shri Sudhir Sopory FNA
Dr. P.V. Sane FNA
Dr. Girish Sahni FNA
Padma Shri P. Pushpangadan
Prof. R.K. Kohli FNA
Prof. Ashok Sahni FNA
Dr. V.P. Kamboj FNA
Justice K.L. Sharma
Shri L.K. Jhunjhunwala
Dr. Amrita Dass
Prof. P.K. Seth
Dr. Sanjay Kumar
Prof. S.K. Barik

**Information Technology Advisor**
Col. Ajay Gupta

**Environmental Awareness Committee**
Dr. Prerna Mitra
Dr. Sadhna Ajay
Dr. Anuradha Sharma
Dr. Rashmi Soni
Mrs. Saima Khan
Mrs. Vandana Pandey

**Newsletter Publication Committee**
Dr. A.K. Singh
Prof. Y.K. Sharma
Dr. S.C. Sharma

**Published by**
**Clean and Green Environmental Society**
**Head Office**
Green Villa, 2/111
Vishwas Khand, Gomti Nagar
Lucknow-226 010, U.P. (India)
**Telephone**: 0522-4006408
**Mobile:** 091-9415343141
E-mail: cleanandgreenenv@gmail.com
scsharmagardener@gmail.com
Website: www.cgesindia.org

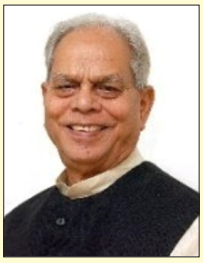
# चन्द्रभानु गुप्त कृषि स्नातकोत्तर महाविद्यालय

बख्शी का तालाब, लखनऊ (उ.प्र.) - 226 201

नैक द्वारा मूल्यांकित- 'बी'' ग्रेड

Website: www-cbgagcollege-org

E-mail: infocbgl@gmail-com



मा. श्री भगवती सिंह जी

(संस्थापक व प्रबंधक)

## संचालित पाठयक्रम

बी.एससी. (कृषि)

एम.एससी. (कृषि) - शस्य विज्ञान, उद्यान विज्ञान, मृदा विज्ञान एवं कृषि रसायन व कृषि प्रसार विभाग

(आई.सी.ए.आर. पाठ्यक्रम पर आधारित)

बी.एससी. - (विज्ञान वर्ग-गणित व जीव विज्ञान)

छात्रावास, खेल, योगा, जिम, कैंटीन सुविधा व कृषि प्रक्षेत्र उपलब्ध

**(प्रवेशित छात्र/छात्राओं हेतु निःशुल्क कोचिंग सुविधा)**

---

army printing press
www.armyprintingpress.com
Lucknow (0522) 6565333