



ONLY NEWS PAPER PUBLISHED IN INDIA FOR SCIENTIFIC COMMUNITIES

NESA

NATIONAL ENVIRONMENTAL SCIENCE ACADEMY

Vol. 20 Issue - 06 (MONTHLY)

June 2017

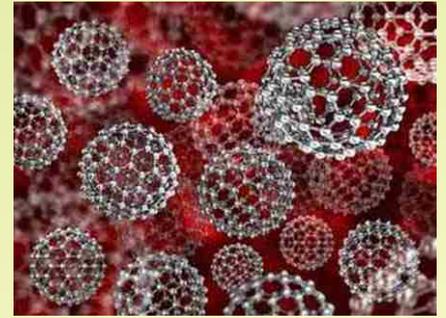
Nanoparticles: A Better Tool for Delivery of Desired DNA and Vaccine

Nimisha Sharma, Sanjay Kumar Singh,
Manish Srivastav and Pragati Pramanik

Division of Fruits and Horticultural Technol., ICAR-Indian Agricultural Research Institute, New Delhi, 110012

Many gene delivery methods have seen the light over the past four decades. DNA vaccination also becomes an important mode for the induction of protective immune responses. DNA vaccines are more useful than traditional vaccines due to increase stability, rapidness, inexpensive production, and flexibility to produce vaccines for a wide variety of infectious diseases. However, the immunogenicity of DNA vaccines delivered as naked plasmid DNA is often not advantageous due to degradation of the DNA by nucleases and inefficient delivery to immune cells. But now a days, biomaterial delivery systems based on micro- and nanoparticles that encapsulate plasmid DNA represent the most promising strategy for DNA vaccine delivery. Polymer nanoparticles have led to an enhanced development of gene therapy for different diseases in the past years. The rise of many biocompatible materials led to the development of gene therapy systems that will revolutionize the field of gene therapy. The formulation of DNA vaccines into micro- and nanoscale particles also has implications for the immunogenicity of the delivered vaccines. Particles ranging in size from 1 to 10 nm are the preferred platforms for targeted delivery to APCs due to their preferential uptake by APCs over other cells, and the bulk size of micro particles creates depots of

DNA that allow for sustained exposure to cells. In contrast, nanoparticles have the ability to directly reach the lymph nodes, have multiple routes of uptake, and often achieve overall higher transfection efficiency when compared to micro particles. Microparticulate delivery systems allow for passive targeting to antigen presenting cells through size



exclusion and can allow for sustained presentation of DNA to cells through degradation and release of encapsulated vaccines. In contrast, nanoparticle encapsulation leads to increased internalization, overall greater transfection efficiency, and the ability to increase uptake across mucosal surfaces. Moreover, selection of the appropriate biomaterial can lead to increased immune stimulation and activation through triggering innate immune response receptors and target DNA to professional antigen presenting cells.

Polymeric delivery systems can complex or physically encapsulate DNA into nano- and microparticles to provide greater protection from nucleases, allow for tunable degradation and controlled release, and facilitate modification to achieve cell-specific targeted delivery.

contd. on page 2 col. 1

APPLICATIONS ARE INVITED

FOR THE AWARDS 2017

LAST DATE **31st JULY 2017**

FELLOWSHIP AWARD

FELLOWSHIP is the highest award given by this Academy. The recipients shall get Citation, Certificate, Memento and a Gold plated medal, and can suffix F.N.E.S.A. after their names.

BEST SCIENTIST AWARD

The Academy confers BEST SCIENTISTS AWARD every year. The recipient shall get Citation, Certificate, Memento and a Gold plated medal.

EMINENT SCIENTIST OF THE YEAR

The recipient shall get Citation, Certificate, Memento and a Gold plated medal.

SCIENTIST OF THE YEAR AWARD

The recipients shall get Citation, Certificate, Memento and a Gold plated medal.

ENVIRONMENTALIST OF THE YEAR AWARD

The recipients shall get Citation, Certificate, Memento and a Gold plated medal.

JR. SCIENTIST OF THE YEAR AWARD

The ACADEMY confers this award to Scientists below the age of 35. The recipients shall get Citation, Certificate, Memento and a Gold plated medal. Applicants should not be more than 35 years on 31-12-2017.

PRESCRIBED APPLICATION FORMS

Separate application form should be used for separate awards. The forms are non transferable and it can be had by sending a bank draft of Rs. 1000-00/\$40 only (per form), drawn in favour of **NATIONAL ENVIRONMENTAL SCIENCE ACADEMY** payable at **NEW DELHI**.

GENERAL SECRETARY

NATIONAL ENVIRONMENTAL SCIENCE ACADEMY

206, Raj Tower-1, Alaknanda Community Centre,
NEW DELHI-110019 (INDIA) Tel.: 011-2602 3614

E-mail: nesapub@yahoo.co.in;
nesapublications@gmail.com

Website: www.nesa-india.org

Challenges for Global Biodiversity

S. K. Basu

UFL, Lethbridge AB Canada; email: saikat.basu@alumni.uleth.ca



While we are celebrating Environment Day on June 5th this year; the global biodiversity is facing monumental challenges for its virtual existence due to several unfortunate anthropogenic factors and decisions. Environment pollution, climate

change and global warming, rising sea level around the planet, melting of polar ice sheets, expansion of heavy industries and synthetic agricultural practices, exploding human populations around the planet, threats to natural forests, ecosystems and wildlife, unplanned infrastructural development, unrestricted and booming real estate business in developing as well as developed and under developed nations, socio-economic and socio-political disturbances in several

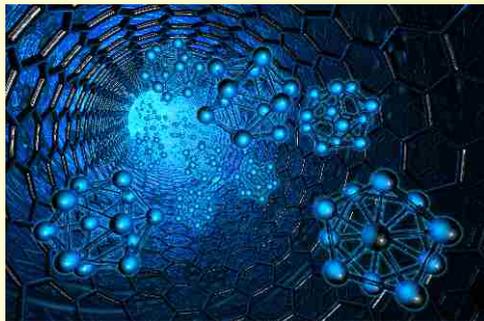
countries along with forest fires, poaching, over exploitation and over hunting, wildlife and forest product trafficking, diseases and natural disasters are challenging global biodiversity significantly. Every nation on this planet on either hemisphere has been impacted by some form of challenges with conservation of biodiversity in some way or other. There is no part of this planet now that could be considered to be safe and free from some form of negative anthropogenic foot prints. It is important for all of us to think about this serious eco-environmental cost this Environment Day from a global perspective.

Our planet is blessed with tremendous and unimaginable biodiversity in various forms of life such as distinct flora and fauna. Unfortunately, we have historically failed to perceive their importance in our life due to our greed, ego, short sightedness and foolishness. We are losing species at an astonishing rate faster than we



contd. on page 3 col. 1

contd. from page 1 col. 2



Perhaps, the most widely studied polymer for DNA vaccine development is poly(lactide-co-glycolide) (PLGA). PLGA nano- and microparticles have been used to encapsulate and deliver DNA vaccines against a variety of diseases including

cancer, swine influenza, parasitic infections, and hepatitis B. Although delivery of DNA using PLGA particles has been shown to induce immune responses, the encapsulation process can unfortunately lead to DNA degradation and ultimately lower transgene expression. In addition to utilizing PLGA for DNA encapsulation, DNA-coated PLGA microparticles have been reported to facilitate increased DNA loading, reduce DNA degradation throughout the formulation process, and enhance the delivery of DNA vaccines to APCs. Quantum dot-loaded PLGA nanoparticles with a glycol chitosan shell for dual live cell tracking and DNA vaccine delivery are using. The cationic glycolchitosan shell allowed for electrostatic interaction with pDNA vaccines to increase loading and promote pH-dependent intracellular release. Another synthetic polymer that has been widely used in DNA delivery, including DNA vaccines, is polyethylene imine (PEI). Although the use of PEI as a non-viral gene delivery vector is well documented, PEI/DNA complexes do suffer from toxicity issues as well as aggregation in the presence of serum proteins and rapid clearance from circulation, which combine to limit the efficiency of DNA vaccine delivery. Therefore, PEI/pDNA complexes coated with g-polyglutamic acid (g-PGA) for intravenous delivery of malaria DNA vaccine are used. The addition of g-PGA greatly reduced the surface charge of the particles, leading to decreased aggregation and greater stability in physiological conditions. cSLN containing a cocktail of DNA vaccines against *Leishmania major*, a protozoan parasite responsible for cutaneous leishmaniasis. These cSLN represent a unique delivery system for enhancing the immune response due to the presence of 1,2-dioleoyl-3-trimethylammonium-propane, a cationic surface-active lipid that has been shown to activate DCs and drive their

maturation through binding of PRR₅₇ highlighting the adjuvant activity of some lipid delivery platforms. Polymer nanoparticles have led to an enhanced development of gene therapy different diseases in the past years. The rise of many biocompatible materials led to the development of gene therapy systems that will revolutionize the field of gene therapy. NPs can be great alternative of the conventional viral and nonviral gene delivery methods. The gene targeting using biocompatible NPs will definitely result in an enhanced patient treatment of various diseases and disorders. Moreover, the use of polymer nanoparticles in gene delivery has shown to have less undesirable effects and better targeting. The synthesis methods of PNPs, the polymers used and surface fictionalization should all be taken into account to get the therapeutic effectiveness of a therapeutic NP.

In last clinical evaluations are extremely significant and are not yet widely investigated. The current outcomes are inadequate to make a final opinion regarding the effectiveness of NP based gene therapy. Therefore, toxicity studies in vitro and in vivo are needed so that researchers can translate this advanced basic research to the bedside. In addition, toxicological studies "Nanotoxicology" has focused on the safety of nanoparticles based therapies, however, only few studies have been reported so far. So, the realization of PNPs gene therapy still needs further proof of concept. Moving from the lab to the clinic has not yet been achieved. In the future, research in this area still requires in depth studies that involve functional assays. The nanomaterial should be designed and characterized; then, the routes of administration of the PNPs gene therapies should be confirmed and finally, the synthesis methods should be streamlined in order for the formulations to be replicated at the industrial level.

References

- Eric Farris , Deborah M Brown, Amanda E Ramer-Tait and Angela K Pannier. Experimental Biology and Medicine 2016; 241: 919-929. DOI: 10.1177/1535370216643771.
- Nguyen DN, Green JJ, Chan JM, Langer R, Anderson DG. Polymeric materials for gene delivery and DNA vaccination. *Adv Mater* 2009;21:847-67.
- O'Hagan DT, Singh M, Ulmer JB. Microparticles for the delivery of DNA vaccines. *Immunol Rev* 2004;199:191-200.
- Prabha S, Zhou W-Z, Panyam J, Labhasetwar V. Size-dependency of nanoparticle-mediated gene transfection: studies with fractionated nanoparticles. *Int J Pharm* 2002;244:105-15.

contd. from page 2 col. 2

could even discover, identify and describe them. The monumental loss of biodiversity across all countries including developed, developing and under developed nations is a global loss and a loss that is impacting our own survival on this planet in a detrimental fashion. Global food security has been jeopardized due to loss of food biodiversity in many parts of our planet due to unrestricted, illegal, unsupervised and non-judicious harvest and over exploitation of large number of terrestrial, marine, estuarine and fresh water species.

Not replenishing their wild stock compensating for the gigantic industrial scale wild harvest they have been depleted beyond their recovery doing irreparable damage to the natural ecosystems and completely disrupting natural food chains and food webs linking millions of species directly or indirectly dependent on them in addition to humans. Being top predator and consumer of all the ecosystems that exist on the earth today we have been completely irresponsible, callous and extremely selfish in leaving no space for other species to co-inhabit successfully. This in turn is taking their revenge on human socio-economic life by loss of economic opportunities, growth and development as they are no longer available in that particular ecosystem to sustain our life and valuable food sources.

Commercial agriculture around the planet has achieved great success for it's appeal for generating uniform and showy products while cutting across the global agricultural biodiversity or agri-biodiversity in a significant manner. Several local land races, varieties, germplasm have been lost to commercial and industrial agriculture, giant monocultures and strong corporate influence in the agricultural sector. As a consequence, local variability in several commercially important plants and animal are being lost permanently due to ignorance, lack of interest in protecting local gene pools and lack of initiatives for conservation of agricultural biodiversity. Extensive use of synthetic chemicals such as pesticides and synthetic fertilizers have altered the



chemical nature of the soil and surface run off has accumulated toxic chemicals in adjacent water bodies and contaminated ground water table.

This in turn has impacted both soil and water microflora with crop production hindered on the fields and promoting eutrophication in surface water bodies while deadly accumulation of toxic and very slowly biodegrading chemicals in the soil and in the precious ground water resources. The results have proved to be detrimental for both humans and domestic/farm animal health; as well have negative consequences for adjoining water resources, forests, local wildlife and biodiversity. Pesticides targeting pests are also killing millions of other farmer friendly, non-target insect species that are either predators of the insect pests or are useful to the farmers in form of pollination, natural biodegraders. Our animal and plant crop new high yielding, and cultivars. The highly linked with global lives responsible for sustained our life and

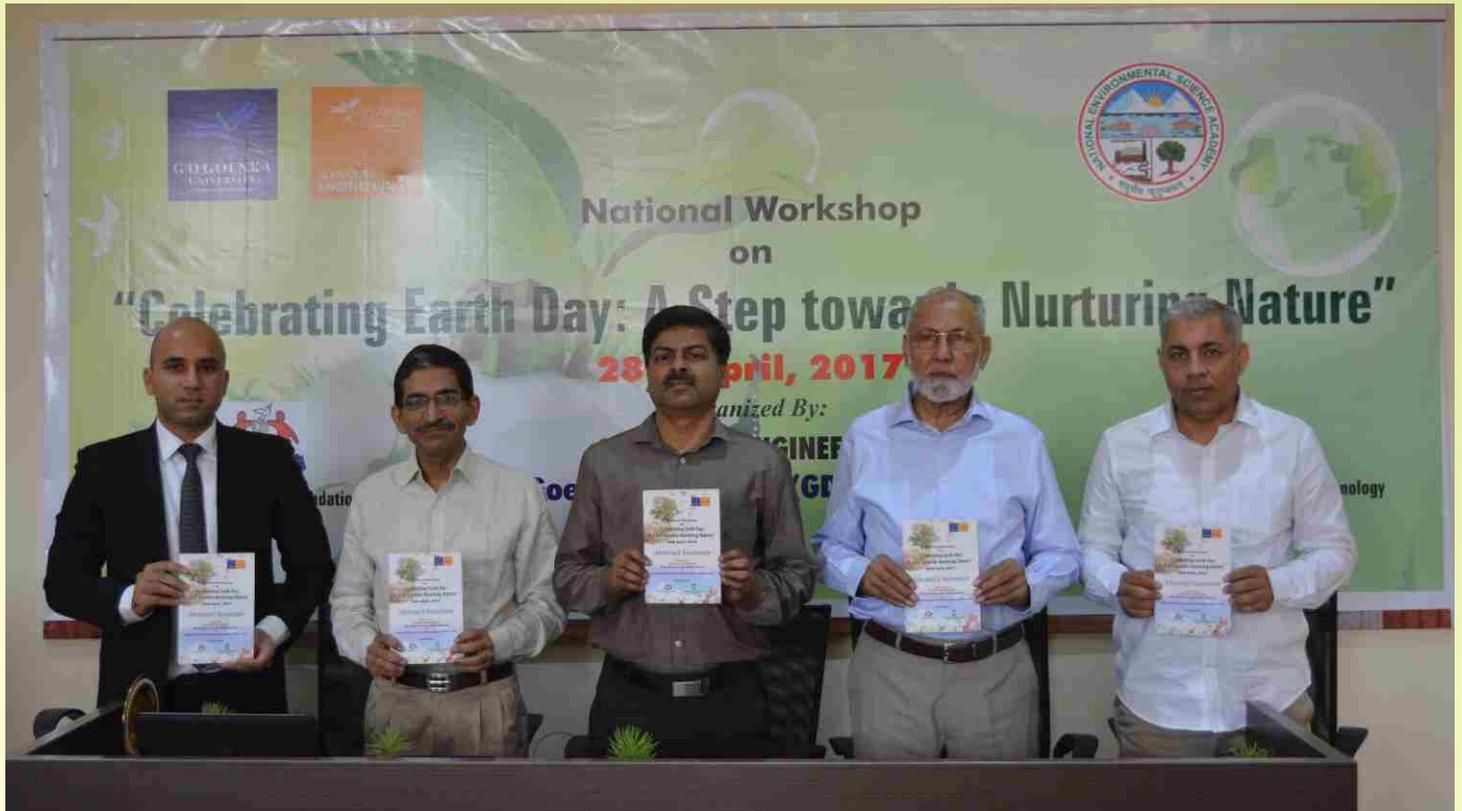
wildlife, food sources dealt with priority at a global level with each nation pledging to do its part to contribute a better living space for our future generations. Without this initiative all our human endeavours will not be able to find any space for growth and development in the not so distant future. Our selfish needs and demands across the globe have resulted in the depletion of population stocks of several marine and terrestrial flora and fauna.

Unless we wish to sit together and discuss on a platform of cooperation and coordination; our common future looks absolutely dim and dark no matter which part of the world we live. The deep dividing, contentious line between the rich developed nations and poor



contd. on page 8 col. 1

Report of National Workshop
on
“Celebrating Earth Day: A Step towards Nurturing Nature”
28th April, 2017
School of Engineering, GD Goenka University, Gurgaon



Earth Day is an annual event, celebrated on 22nd April, worldwide to demonstrate support for environmental protection. It was first celebrated in 1970, and is now coordinated globally by the Earth Day Network and celebrated in more than 193 countries each year. On Earth Day 2016, the landmark Paris Agreement was scheduled to be signed by the United States, China, and some 120 other countries. This signing has satisfied a key requirement for the entry into force of the historic draft climate protection treaty adopted by consensus of the 195 nations present at the 2015 United Nations Climate Change Conference in Paris.

Today, the fight for a clean environment is going on with increasing urgency, as the ravages of climate change have become more manifest every day.

This year GD GOENKA University and National Environmental Science Academy (NESA) got the opportunity to celebrate earth day. GD Goenka University (GDGU) and National Environmental Science Academy (NESA) jointly



organized a National Workshop on “Celebrating Earth Day: A Step towards Nurturing Nature” on 28th April, 2017 at GD Goenka University, Sohna Gurgaon Road, Sohna, Haryana-122103.

contd. on page 5 col. 1

contd. from page 4 col. 2

In the present circumstances, the threats being faced by the environment, biodiversity, agriculture and health needs urgent consideration in order to provide good quality of air, water and food for all. The five broad themes on water management and conservation, soil conservation, biodiversity, waste management and disaster management were discussed in detail in the present event.



The Inaugural session of National Workshop on "Celebrating Earth Day: A Step towards Nurturing Nature" was started with the welcome note by Prof (Dr.) Sudeep Sharma, Assistant Dean, School of Engineering, GDGU on the workshop, its themes and importance of conservation for present and future generations. It was followed by an oath by all the dignitaries, guests and participants present to protect the mother Earth and then unveiling of souvenir book of workshop. A brief introduction of National Environmental Science Academy (NESA) was given by the President NESA, Prof. Javed Ahmad. The President, of NESA, Prof. Javed Ahmad, apprised the participants of various academic activities under taken by the Academy, especially with regard to Science and Environment.



Keynote address was delivered by Guest of Honor, Dr. Sanjay Bajpai, Scientist from Department of Science & Technology, titled- "Technology as an enabler for Sustainable Development: Approach to find out technological solutions for water and energy challenges".



Dr. Nelay Khare, Scientist, Ministry of Earth & Sciences as Guest of Honour grace the occasion and deliver a talk. To create the awareness and as a step towards nurturing nature Tree plantation ceremony was held in the garden arena of the University, where the guest of honors, assistant dean, chairperson, invited guests planted various trees. All the register students became witness of this plantation. Five type of medicinal trees were planted by the invited guests for demonstrating the importance of native species.



The workshop was supported by SERB-DST and The Earth Saviours Foundation (TESF), Gurgaon. TESF is involved in awareness program regarding noise pollution, wherein they run



contd on page 6 col. 1

contd. from page 5 col. 2

campaign named 'Do Not Honk'. The workshop comprised of 6 plenary lectures, 18 poster presentations. Two Best Poster Awards were also given to winners. The workshop participants were offered with conference kits, high quality food and tea. The published Abstract book were also distributed among the participants of the workshop.



Foundation and the important activities of his organization were introduced. Later, a three member Judge Panel was formed to select the winners for Poster presentation competition. Mr. Abhinav Garg from Delhi University and Ms. Aarushi from GD Goenka University got the best poster Award. This forenoon session was followed by the lunch to all the participants, volunteers, committee members and Guests.

Then the workshop proceeded with a lecture by Prof. RK Sharma, from Department of Chemistry, Delhi University. He delivered a very informative and inspiring lecture on Green Chemistry emphasizing the importance of 'Earth Day'. Then Mr. Ravi Kalra gave a brief introduction about his foundation, The Earth Saviours

The afternoon session was started with the lecture on Drug Toxicology and its effect on the environment by Prof. RK Singh, Central Drug Research Institute, Lukhnow, Important and interesting lecture on water conservation by Dr. Laxman Prasad,



contd on page 7 col 1

contd. from page 6 col. 2



Ex-Advisor DST was held. The workshop concluded by Prof. Javed Ahmad, President NESA followed by the valedictory session and High Tea. Prof. Javed Ahmad also gave an invited talk on Medicinal plant diversity and its conservation. The workshop brought

together the leading Researchers, and academicians in interest of dissimilation of scientific knowledge.

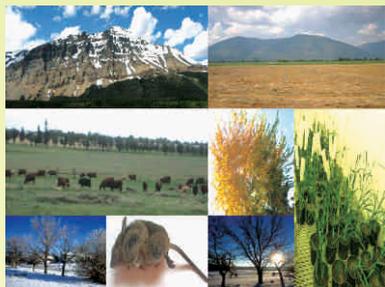
Dr. Shefali Gola
Organising Secretary

....Continued from Page 3, Col 2



developing nations has been the key factor in this process of dialogue. Unless both sides want to walk a few more steps to reach an agreement with some compromises on either side; our shared future as co-inhabitant of this planet is under serious jeopardy and only we as humans are to be blamed for that and no one else. It is our common

responsibility to look forward for a better place to live and share for us as well as for our future generations.



If we fail to remember this for our selfish, short term gains without looking at this from the perspective of a global citizen we ourselves should be responsible for our final demise; since we failed to take important key decisions at the need of the hour. Let us forget our differences and grievance against one another as nations

for just once; and behave and act responsibly as a citizen of this planet to secure our future through sustainable life style; promoting green economy, green energy and green development for our shared future. Global biodiversity has provided humans with uncountable large number of advantages for centuries for providing the fuel for economic growth, sustainability and development. In exchange anthropogenic footprints have only negatively contributed for the unfortunate and sad demise of thousands of species around the planet that have been reported; and several more in counts that we do not even have proper data for any scientific evaluation. It is time for our payback to nature. *Let us take the pledge for protecting global biodiversity against all odds in the Environment Day this year to secure our own future and the future of our next generations.*



Photo credit: S. K. Basu

To,

Vol. 20 Issue - 06 (Monthly)

June 2017

From

NATIONAL ENVIRONMENTAL SCIENCE ACADEMY

206 Raj Tower -1, Alaknanda Community Centre,

New Delhi -110019. Ph.: 011-2602 3614

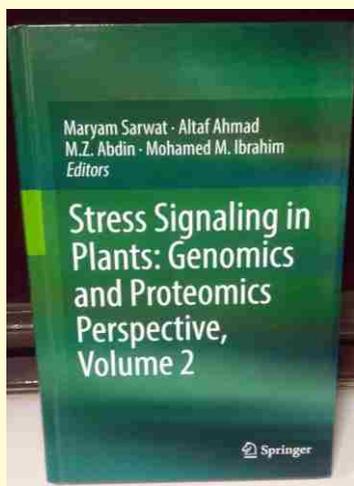
E-mails: nesapublications@gmail.com; nesapub@yahoo.co.in

INVITATION OF RESEARCH ARTICLES for the PUBLICATION in NESA Journals

INTERNATIONAL JOURNAL ON AGRICULTURAL SCIENCES - NAAS RATING 2.60
INTERNATIONAL JOURNAL ON ENVIRONMENTAL SCIENCES - NAAS RATING 3.06
INTERNATIONAL JOURNAL ON BIOLOGICAL SCIENCES - NAAS RATING 3.14
INDIAN JOURNAL OF UNANI MEDICINE - ISSN NO. 0976-4526

These JOURNALS ON DIFFERENT SUBJECTS are being published by this Academy. Send your manuscripts for peer-review by e-mail. **THE AUTHORS MUST MENTION ADDRESS, Contact Nos. and E-MAIL ID** in their forwarding letter. Proof will be sent for correction before publishing. A pledge for originality will be signed by the authors. Five sets of reprints will be dispatched within 30 days after the receipt of the **PROCESSING FEE**. alongwith a press print soft copy of final version of manuscript. All remittances are to be sent by a crossed Bank Draft in favour of **NATIONAL ENVIRONMENTAL SCIENCE ACADEMY** payable at **NEW DELHI**.

For further details and **NOTES FOR AUTHORS**, please contact Academy at nesapublications@gmail.com; nesapub@yahoo.co.in



Stress Signaling in Plants: Genomics and Proteomics Perspective (Vol2)

Published by: Springer

Editors: Maryam Sarwat, Altaf Ahmad, M.Z. Abdin, Mohamed M. Ibrahim

This two-volume set takes an in-depth look at stress signaling in plants from a uniquely genomic and proteomic perspective and offers a comprehensive treatise that covers all of the signaling pathways and mechanisms that have been researched so far. Currently, plant diseases, extreme weather caused by climate change, drought and an increase in metals in soil are amongst the major limiting factors of crop production worldwide. They devastate not only the food supply but also the economy of a nation. With global food scarcity in mind, there is an urgent need to develop crop plants with increased stress tolerance so as to meet the global food demands and to preserve the quality of our planet. In order to do this, it is necessary to understand how plants react and adapt to stress from the genomic and proteomic perspective. Plants adapt to stress conditions by activating cascades of molecular mechanisms, which result in alterations in gene expression and synthesis of protective proteins. From the perception of the stimulus to the transduction of the signal, followed by an appropriate cellular response, the plants employ a complex network of primary and secondary messenger molecules. Cells exercise a large number of noticeably distinct signaling pathways to regulate their activity. In order to contend with different environmental adversities, plants have developed a series of mechanisms at the physiological, cellular and molecular levels that respond to stress. Each chapter in this volume provides an in-depth explanation of what we currently know of a

particular aspect of stress signaling and where we are heading. Together with the highly successful first volume, Stress Signaling in Plants: Genomics and Proteomics Perspective, Volume 2 covers an important aspect of plant biology for both students and seasoned researchers.