



# Communique

Indian Association for Productivity Quality and Reliability

Vol. XXXIX

No. 2

April - June, 2017

## From the Editor's Desk

### PLURALITY, DIVERSITY AND INTOLERANCE

The *Universal Periodic Review Report* of UNO, released on 5 May 2017 at Geneva, has severely criticized Indian Government for religious intolerance, atrocities against women, gender discrimination and particularly for violation of human rights in Kashmir. It has further been observed in the *Report* that accepting the recommendations of the UNO, India had earlier agreed to provide more legal assistance to the poor and the marginal, but nothing effective has been done in this regard. Incidents of keeping in jail custody indefinitely without trial are on the increase in the country. It has been claimed in the *Report* that the downtrodden, the tribals and the muslims are worst victims in this regard, and that during the last four years, India has taken no steps to mitigate large scale malice and discrimination against the minority community. As regards gender discrimination, it has been observed that there has been no progress in the country in respect of arresting incidence of crimes against women and conclusively winding up of investigations regarding such reported crimes.

This UNO *Report* is released every four years. The four-year period to which this latest *Report* relates mostly comes under the tenure of the BJP-led government at the Centre. And as such, this has seriously tarnished the secular image of the present Central Government at the international forum on the eve of its completion of three years in power.

This uncomfortable report is perhaps not unexpected in the backdrop of some recent unfortunate incidents taking place in the country betraying blatant intolerance on the part of those in power and their followers in religious beliefs, customs, food habits and the like, and more importantly, in matters of freedom of expression.



Participants and some resource persons at the Workshop on Soft Skill Development at NCCC.

Historically, Indian society has nurtured through the ages, various forms of diversity – ethnic, religious, cultural, linguistic, political etc., to name only a few major ones – into its fold to lend beauty and colour to our tradition. In fact, our country has been a veritable melting pot for these diverse forces and influences absorbing and assimilating them into something unique called Indian civilization. Acceptance and peaceful co-existence of diversity has long been recognized as the hallmark of this pluralistic society. Way back in September 11, 1893, at the Chicago Parliament of Religion, Swami Vivekananda proclaimed with his head held high : I am proud to belong to a religion which has taught the world both tolerance and universal acceptance. We believe not only in universal toleration, but we accept all religions as true. I am proud to belong to a religion whose holy Sanskrit language just cannot translate the English word 'exclusion'. Another great son of our country, the bard Rabindranath Tagore, in his famous composition *Bharat Tirtha* – the holy place of pilgrimage that is India – has sung the glory and beauty of unification of various forms of diversities into what is today the unique Indian civilization.

An affirmative interpretation of the concept of diversity as a value is something to be cherished, fostered and exploited. A garden with just a single variety of flower may look uniform and homogeneous, but certainly not as beautiful and gorgeous as one with a good many varieties of different shapes, colours and fragrances. A democracy with just a single political party cannot lead a country to the desired height of excellence and prosperity in the absence of criticisms and alternative viewpoints put forward by a strong opposition. The ideal situation is : Allow enough space for diversity in every respect to flourish. Arrange for healthy debate wherever there is a scope. And try to emulate the best in each. Coming back to Swami Vivekananda once again, let us remember what he forcefully advocated for :

Contd. to page 2

## Contents

- Plurality, Diversity and Intolerance. Editorial / 1
- The Story of GM Seed in India. Dr. Suvendudev Chatterjee / 2
- IAPQR News / 4
- Letters to the Editor / 6
- R & D Snapshots / 7
- A Personal Mission Statement / 8
- List of New Members / 8
- Thought for To-day / 8

What we need most now is Hindu brain with Islamic physique.

The undersigned had a rich first hand knowledge of the forms and extent of diversity in the entire length and breadth of the country during July 1995 to June 1998, when he was at the helms of the affairs for implementing the *Campus Diversity Initiative* (CDI) programme of Presidency College, Calcutta, as one of the 24 universities/colleges throughout the country, selected by the Ford Foundation for funding. As in the Western countries, in India too, different forms of diversity - particularly religious and linguistic - at that time sometimes reached flash points endangering the peace and harmony of the society. The CDI programme was designed to project diversity as an opportunity, rather than a threat, in the young minds. Many positive outcomes of the programme notwithstanding, one somewhat negative feeling the undersigned developed during these three years while attending many of the programmes organized by different colleges/universities across the country is that the doctrine of 'Unity in Diversity', so loudly professed over the years by our leaders as the theme and spirit of Indian democracy has of late been degenerated into only a slogan. The idea, admirable as it is, has been worn threadbare by overuse in and out of context. Having lost its force, it has now become a cliché which often tends to yield the negative implication that unity should be sought at the cost of diversity, that it lies in the leveling of all differences. It fails to envisage the prospect of unity with and through diversity, rather than in spite of it.

The situation appears to be not much different even to-day. The million dollar questions are : In such a pluralistic set-up, how to ensure adequate tolerance effectively, so that such untoward events do not recur? How to allow enough of space for various forms of diversity to co-exist and thrive? How to ensure that the majority on any count in the society take care to protect the many interests of the minority as an essential precondition of a strong democracy?

The answers are not easy to find. No legislation, howsoever suitably designed and howsoever strong, can enforce these. To ensure such a desirable situation, the nation has to have a visionary leader who has the capability of rising above petty politics and interests of various diverse groups inspite of himself belonging to one or more of these. One who has the guts not to care a fig for erosion in vote bank. One who is capable of winning spontaneous love and loyalty of the entire nation cutting across all diverse sects through his towering stature and personality, and owing to his genuine and unquestionable concern for the welfare of the entire mass irrespective of caste, creed and colour.

Such visionaries are indeed very few and far between. We have to wait for one such perhaps for long, indeed very long. But, then, waiting time of any length for such a much sought-after leader is certainly worth it. ■

  
(B. Das)  
Chief Editor

## Lead Article

### THE STORY OF GM SEED IN INDIA

**Dr. Suvendudev Chatterjee**

Former Director of Agriculture, Govt. of W. Bengal

March 26, 2002 is a Red Letter Day in the history of Indian Agriculture. On this date the Government of India took a revolutionary decision to clear Genetically Modified (GM) Bt cotton seed for commercial cultivation in the country overruling the marathon protest by anti-GM lobby. The major challengers to GM cotton at that time were mainly Greenpeace, Gene campaign. For their great hubbub the issue of its commercial release was hanging fire since 1998. During this period the seed was under field trial in 40 locations spread over four states under critical scrutiny of GEAC, a multidisciplinary committee of the Government. The results of the trials were highly satisfactory in all the states with respect to its performance and security for its release in the environment. The demand for its commercial use took centre stage in 2001 when severe bollworm attack wiped out much of the standing traditional crop, save the Bt crop which a Gujarat based firm procured illegally and sold to the farmers. Thus the Govt of India was compelled to officially release the first GM crop for commercial

cultivation yielding to pressure from farmers, the end users of the seed. The GM cotton gradually became so popular that now it occupies 95% of cotton area in the country. The use of chemical pesticide to control bollworm has been reduced to 222mt in 2011-12 from 4407mt in 2002-03. Country's cotton productivity has also risen to 541kg/ha in 2013-14 from a meagre 321 kg/ha in 2002-03. The crop is being grown widely since last decade. But till date there is no evidence that GM cotton is harmful to the environment and human/animal health. The farmers' suicidal case often mentioned by the opponents of Bt cotton could not be proved to be due to growing of Bt cotton. In West Bengal also reports came out that paddy/potato growers committed suicide, although they did not grow GM seed. For farmers' suicide there might be thousand and one reasons. It is not a fact that cotton-seed yields only fibre (lint), but also oil and oilcake (meal) fed to animals. Cotton-seed oil is, in fact, the second largest produced edible oil in the country (1.4 million tonnes) after mustard (2 million

*Contd. to page 3*

tonnes). That makes cotton no less of a food crop. And since 95 per cent of India's cotton production is today Bt, its allegedly harmful toxins would already have been consumed directly or indirectly during the last decade and more. *The U.S. National Academy of Sciences, Engineering and Medicine* released a report in May 2016 that once again reiterated the safety of consuming GMO crops. Both the Indian National Academy of Sciences and the Indian National Academy of Agricultural Sciences have also endorsed the safety of eating and the growing of GM crops.

Similarly to control a menacing pest, fruit shoot borer of brinjal, three groups in India - two from the public sector and one from the private sector - started developing transgenic Bt varieties of eggplant transferring gene from soil bacteria, *Bacillus thuringiensis*, that provide resistance to the fruit and shoot borer. The Indian Agricultural Research Institute (IARI) and Tamil Nadu Agricultural University (TNAU) are testing a variety that has the Cry1Ab gene while the Maharashtra Hybrid Seeds Company (MAHYCO) obtained the gene Cry1Ac from multinational seed company, Monsanto. The agreement involving MAHYCO was signed in 2005 along with two agricultural universities - *University of Agricultural Sciences (UAS), Dharwad* and *Tamil Nadu Agricultural University (TNAU)*. Brinjal in India is popular for its widespread consumption and cultivation. The development and commercialization of Bt eggplant thus has potentially significant economic and social implications for farmers in the country.

An expert committee (EC - I) was set up in 2006 to examine the biosafety data presented by MAHYCO. They concluded that while the current data demonstrated that Bt brinjal was safe and equivalent to its non-Bt counterpart, more studies were required to re-affirm the findings and further trials were needed to ascertain the benefits from Bt brinjal with respect to existing methods for pest management and pesticide reduction. They recommended to conduct large scale trials. In 2009, a second expert committee (EC - II) examined the data from these trials. They concluded that adequate safety tests had been performed, stating that "the benefits of Bt brinjal event EE-I developed by M/s MAHYCO far outweigh the perceived and projected risks", and advised the Genetic Engineering Appraisal Committee (GEAC) to recommend commercialization of the Bt brinjal. The GEAC cleared Bt brinjal for commercialization on 14 October 2009. This time the anti - GM lobby of the country became furious. They organized agitation in most of the states urging to ignore the opinions of all Expert Committees and stop licensing Bt brinjal. Following concerns raised by a group of scientists and anti-GMO activists, the Government of India officially imposed a moratorium on 17 February 2010, on the release of transgenic brinjal hybrid, and not a permanent ban. Till date it is lying in in the cold storage. Although on October 30, 2013 with approvals from the ministries of Environment and Forests (MoEF) and

Agriculture (MoA), the Bangladesh Agricultural Research Institute (BARI) received permission to release the same varieties of Bt brinjal developed by MAHYCO for the 2013-2014 growing season. The Bt varieties underwent seven years of field and greenhouse trials in various environmental and geographic locations in Bangladesh. In September 2016 the Indian *Business Standard* quoted a Director of the Bangladesh Department of Environment who said that production results had been very good. The anti-GM lobby in India now wrote to Govt of India to keep strict vigilance in Indo-Bangladesh border to stop smuggling of Bt brinjal seed to India by the farmers. God knows how the porous border along the West Bengal can be sealed to stop entry of any such seed. They also started apprehending that the seeds have entered and are under cultivation in West Bengal. So is there any chance of repeat performance of Bt cotton story?

Currently again the GEAC took an attempt to commercialize another GM seed namely Mustard var. BDM-11. In this case it is not a Bt seed. But it is obviously a transgenic mustard hybrid drawing genes from *Bacillus amyloquefecion* and other foreign sources developed by Proagro Seed Company, now a part of Bayer Crop Science. The GEAC approved its field trial by Delhi University on 21 August, 2014 to assess its field performance with special reference to biosafety in open environment. After test the review committee reported that the GM Mustard registered advantage over popular mustard under cultivation to the tune of 21% in yield and 15% in oil. GEAC on being satisfied also from the biosafety point finally recommended to the Ministry for its commercial release. Soon as the news came in the air the anti - GM lobby started countrywide protest convention to stop its licensing for commercial cultivation by the Ministry. Some political personalities also hold the same opinion regarding licensing GM food crop ignoring the fact that Indians have already been consuming Bt corn oil since last 14 years. The favourable scientific report on GM mustard seed does not guarantee a successful outcome. It is only the first step. The ministry is now taking opinions from the general public, NGOs, farmers, and industry. They will then be reviewed before a decision is made regarding commercialization. It should be noted that mainstream scientists and ecologists challenge every one of Greenpeace's claims. There is no evidence that GM crops are harmful to the environment and human health. Most recently, *the U.S. National Academy of Sciences, Engineering and Medicine* released a report in May 2016 that once again reiterated the safety of consuming GMO crops. Both the Indian National Academy of Sciences and the Indian National Academy of Agricultural Sciences have also endorsed the safety of eating and the growing of GM crops. Recently, over a hundred Nobel laureates shot off a letter to NGO Greenpeace calling its campaign against genetically modified (GM) crops 'misleading' and 'unscientific.' The

Contd. to page 7



## • Second Workshop on Soft Skill Development

IAPQR in collaboration with Nivedita Community Care Centre (NCCC) of Ichhapur, Hooghly organized a 3-day Workshop on Soft Skill Development at the latter's premises during April 22-24, 2017. This was the second workshop in the series on this topic.

The Workshop was inaugurated on April 22 at 10.30 a.m. with ceremonial lighting of lamp and vedic chanting. In his welcome address Professor B. Das explained the objectives of the Workshop. The topics covered in 12 interactive sessions during the three days were — Soft Skills : Need for Development; Confidence Building & Personality



Resource persons Dr. R. Mukherjee, Prof. S. P. Mukherjee, Prof. B. Das and Dr. A. Banerjee at the Workshop at NCCC.

Development; Positive Attitude; Data Awareness; Basics of Internet; Time Management; Self Motivation and Entrepreneurship; Communication Skill; and Team Building & Leadership. The resource persons were Professor S. P. Mukherjee, Dr. Aniruddha Banerjee, Dr. Reba Mukherjee, Professor Biswanath Das, Sri Arabinda Bhar, Dr. Surajit Mukherjee, Dr. Ambar Ghose and Professor H. S. Ray. The Workshop was conducted in Bengali.

30 participants from three blocks (Dhaniakhali, Tarakeswar and Pursura) of Hooghly district, besides a few workers and organisers of NCCC, attended. That the Workshop was quite effective was evident from the fact that a group of shy village youths (14 females and 16 males), mostly students and unemployed or underemployed, were transformed into an enthusiastic lot beaming with inquisitiveness, actively participating and putting forward pertinent questions to the resource persons.

In the valedictory session, some participants made a few observations on how they were benefitted from the Workshop. Dr. Indrashish Banerjee, Hony. Director, NCCC,

proposed a vote of thanks. Certificates were distributed to the participants at the end. The 3-day programme concluded with the chorus 'We shall overcome' and the inspirational Tagore Song 'Aaguner Parashmoni' sung by all present.

## • Programme on Multivariate Data Analysis

A 3-day programme on Multivariate Data Analysis was organized by IAPQR at the premises of Institute of Inspiration and Self Development at 18, Ballygunge Circular Road, Kolkata 700 019 during April 27-29, 2017.

The topics covered included : Introduction to Multivariate Data Analysis, Cluster Analysis, Regression Analysis including Multivariate Regression and MANOVA, Principal Component Analysis, Multidimensional Scaling, Classification & Discrimination, Factor Analysis, Classification & Regression Tree, Use of Software etc. The resource persons were Professors S. P. Mukherjee, Asis Kumar Chattopadhyay, Aditya Chatterjee, Gourangadeb Chattopadhyay and Sri S. Adhya.

There were 6 participants.

## • Programme on Research Methodology

IAPQR, at the request of Adamas University, conducted an 8-day course on Research Methodology for their research scholars at their Barasat Campus during April 29 – May 24, 2017 on Wednesdays and Saturdays. Professors S. P. Mukherjee, H. S. Ray, S. B. Bagchi and Asis Chattopadhyay were the resource persons.

## • Talk on Skilling and Employability

Sri P. P. Mitra, Retired Principal Labour and Employment Advisor, Govt. of India and a life-member of IAPQR addressed a Get-together meeting of the Kolkata-based members, at 4.30 p.m. on 27 May, 2017 at IAPQR premises. His topic was : Skilling and Employability in the context of W. Bengal. Some of the points Sri Mitra raised are the following:

- The unemployment situation prevailing in this state is no worse than that in many other states.
- The central questions are: (a) can we encash the demographic dividend we have, to meet the challenges



Resource persons Dr. Ambar Ghose, Dr. Surajit Mukherjee Prof. H. S. Ray and Sri A. Bhar at the Workshop at NCCC.

that the country faces and, (b) are the existing policies right to address the situations?

- The robust growth we have does not link with employment.
- There is a demand-supply mismatch - there are far too many aspirants while the jobs available are too few.
- Most job seekers are unemployable.
- We have far too many engineers but not enough farmers.
- There are efforts to frame regulations for the unorganised sectors, but this will not be easy.
- Perhaps the solution to unemployment lies only in self-employment. But potential entrepreneurs often cannot overcome bureaucratic obstacles and corrupt practices.

There were some interesting observations from the floor. The best take-away were the comments from Prof. S. P. Mukherjee. He observed that the legal definition for an employed person is one who is continuously engaged in a job for at least 183 days a year for at least one hour a day *with or without* remuneration. A child who works for a



A section of gathering at the Get-together meeting

South Kolkata held in the evening of 20th May, 2017. The four other recipients of the *Banga Vibhusan Award, 2017* were the outstanding personalities Sri Nirendranath Chakraborty (Poet), Sri Soumitra Chattopadhyay (Actor), Sri Y. Deveswar (Chairman, ITC Group of Industries) and Sri Arun Prasad Mukhopadhyay (Former D.G., W.B. Police)

Hearty congratulations to Dr. Ganguly for this recognition he deserved so aptly.

#### • Obituary

Prof. E. v. Collani of Technical University of Urzburg, Germany, breathed his last on 25 February, 2017.

An eminent Quality Management theoretician, Prof. Collani was the founder-editor of the journal *Economic Quality Control*. He was a long-time well-wisher of IAPQR, and served as an Associate Editor of *IAPQR Transactions* during 1998-2016. It is through his initiative that *IAPQR Transactions* entered into an exchange programme with *Economic Quality Control*. He is survived by his wife and a daughter.

May his soul rest in peace!

#### • Forthcoming event : International Conference

IAPQR will organise a 3-day International Conference on **New Paradigms in Statistics for Scientific and Industrial Research** during January 4-6, 2018 in Kolkata. The objective is to provide much-needed adequate interactions between the community of scientific and industrial research workers on the one hand and the community of statisticians on the other.

The proposed conference will accommodate some **plenary talks** by eminent scientists, **invited lectures** by identified experts from different areas, and **contributory presentations** by young scientists and research scholars.

A tentative list of areas to be covered during the conference, is as follows :

- Clinical Trials
- Drug Development
- Financial Statistics and Engineering
- Bio-informatics



Distribution of Certificates at the Workshop on Soft Skill Development at NCCC

family business after school hours would be considered employed even if he/she received no remuneration. The income of the head of the family is taken as the income of the whole family. A housewife cannot be considered to be employed because she works for her own family only. Prostitution and betting are economic activities but in India those engaged in these trades cannot be considered as employed because these trades are illegal.

About 20 members attended (HSR)

#### • Honour for member

We are pleased to share with the readers the happy news that Dr. Dhiman Ganguly, the noted Chest Physician of the country with international repute, and a Life Member of IAPQR, has been honoured with *Banga Vibhusan Award, 2017* by the Govt. of West Bengal.

Sm. Mamata Banerjee, Chief Minister of West Bengal, handed over the honour to Dr. Ganguly, at Nazrul Mancha,

- Cryptography
- Machine Intelligence & Learning
- Cloud Computing & Information Security
- Environmentrics
- Network and Communication
- Astrostatistics
- Structural Reliability
- Statistics in Ecology
- Fuzzy Logic
- Internet of Things
- Signal Processing
- Social Network
- Quantum Computing

It is heartening to note that some established research workers from Academia and Industry, both within and outside the country, have already confirmed their participation, while quite a few others have expressed their keen interest in the event.

We are planning to hold a few one-day Workshops to be conducted by some eminent exponents on some selected topics. Such workshops will run in parallel, may be in separate venues.

**Joint Conveners :** Asis K Chattopadhyay & Manisha Pal.

**Session Organisers :** S. P. Mukherjee, Bikas K Sinha, Bimal K Sinha, Asis Sengupta, Subhas Nandy, Atanu Biswas, Sasthi Ghosh, Indranil Mukherjee, Sabyasachi Bhattacharya, Mousumi Bose, Sovan Chaudhuri.

**Registration Fees :** Indian : Rs. 5000 (industry sponsored), Rs. 3000 (others - non-members), Rs. 2,000 (others - members). Foreign : US\$ 250, SAARC : US\$100

**Important Dates :** Last date for submission of extended abstracts (in about 300 words) : August 30, 2017

Authors will be informed of acceptance of their contributions by September 30, 2017

Full papers are expected by November 30, 2017

Last date for registration : November 30, 2017

There is a plan to bring out an Edited Volume, after properly reviewing the full papers received, by a renowned publisher, shortly after the conference.

For further details, please contact the IAPQR Secretariat. ■

IAPQR is grateful to the following members for their generous contribution to different funds of IAPQR during the period under review :

- Professor Aditya Chatterjee
- Professor Asis Kumar Chattopadhyay
- Professor Gouranvadev Chattopadhyay

- Editors

We invite letters from our readers commenting on the quality of contents of *Communique*, and putting forward suggestions for new programmes / activities to be taken up by IAPQR.

- Editors

## Letters to the Editor

### Hats off to Team Communique!

Dear Sir,

Congratulations for the excellent issue Jan-March, 2017 of our newsletter *Communique*. In this issue, I have particularly liked two pieces : 'The Critical Indian' by Prof. H.S. Ray (Editorial) and 'Mechanism to deal with Space Debris' (R&D Snapshots). I fully agree with Prof. Ray that most Indians, while reviewing books/theses/papers take pleasure in finding faults and focusing on drawbacks and shortcomings - real or perceived - overlooking the positive points. This is in no way helpful in improving. Focusing on the positive aspects instead would certainly motivate people to come out with better and more useful contribution in future. Hats off to Team Communique!

Sincerely,

ICFAI University, Tripura  
10 May 2017

Tathagata Dasgupta,

### A Suggestion

Dear Sir,

I am an avid reader of *Communique*, and I have attended a few popular talks/programmes organized by IAPQR as well. Both the exercises usually enrich me a lot. Let me put forward a suggestion for your kind consideration. Let IAPQR, as an organization with appreciable concern for Quality of Life, think of arranging for debates/talks on such contemporary issues as Demonetization, GST, Ransomware (device to hack computers) etc., to educate its members and those interested, and publish the proceedings in the columns of *Communique* for the benefit of a larger audience. Regards,

Sincerely

Kolkata 700 071  
22 May 2017

S. Dey

### The Workshop on Soft Skills has transformed us

Sir,

Let us put it on record that we were immensely benefitted from participation in the Workshop on Soft Skill Development organized jointly by IAPQR and Nivedita Community Care Centre (Ichhapur, Hooghly) during 22-24 April, 2017 at the latter's premises. Honestly, the high-sounding theme of the Workshop frightened us a little at the outset, and we remained closeted within ourselves. But as the sessions unfolded, we gradually became more and more interested and convinced that the topics being discussed would stand us in very good stead in shaping our personality and future career. Towards the end, most of us were found freely interacting with the resource persons in getting our doubts clarified and exchanging our ideas and thoughts. We can now confidently affirm that after attending the Workshop, quite a few of the 30 odd participants have grown in self-confidence, positive attitude and skills for effective communication.

We take this opportunity to request the IAPQR authorities to organize similar workshops at NCCC in future on such topics as : (1) Tips for Facing Interviews; (2) Innovation and Creativity; (3) Strategy Planning into Action; (4) Decision-making; (5) Managing Diversity; (6) Listening Skills; (7) Presentation Skills; and (8) Computer Literacy. Regards,

Sincerely

Singur Govt. General  
Degree College,  
Hooghly  
1 May 2017

Debalina Ghosh & Rimpa Bhandari  
1st Yr. Psychology Hons. Students

### • *Print solar cells at the cost of a newspaper*

Toronto researchers have found a novel way to print perovskite solar cells easily and at a cost similar to bringing out a newspaper! A team, led by Hairen Tan from University of Toronto Engineering found that the solar cells manufactured with perovskite mineral could lead to low-cost, printable solar panels capable of turning nearly any surface into a power generator. 'Economies of scale have greatly reduced the cost of silicon manufacturing,' Ted Sargent, an expert in emerging solar technologies, said in a university statement. 'Potentially, perovskites and silicon cells can be married to improve efficiency further, but only with advances in low-temperature processes,' added Sargent, who is also the Canada Research Chair in Nanotechnology. Perovskite solar cells depend on a layer of tiny crystals — each about 1,000 times thinner than the width of a human hair - made of low-cost, light-sensitive materials. Because the perovskite raw materials can be mixed into a liquid to form a kind of 'solar ink', they could be printed onto glass, plastic or other materials using a simple inkjet printing process.

(Source: Indo Asian News Service, Feb 18, 2017)

### • **India Develops Powerful Pulse Detonation Engine for Cruise, Anti-Tank Missiles**

A paper issued by the DRDO said the engine can be used in cruise and anti-tank missile propulsion, unmanned aerial vehicles. After the basic engine, the Terminal Ballistics Research Laboratory (TBRL), a unit of DRDO, is now working on air breathing multi-tube, multi-cycle pulse detonation engine.

'After achieving single shot detonation in a single tube in liquid fuel, TBRL has achieved multi-cycle operation of 8 Hz in single PDS tube. TBRL is working on air breathing multi-

tube multi-cycle pulse detonation engine with an objective to develop an air-breathing Pulse Detonation Engine (with throttling) to generate 2.5 kN of thrust for a duration of 30 minutes.' Pulse detonation system is a mechanically simpler engine in comparison to the gas turbine engine, wherein the combustion wave travels at supersonic speeds relative to the unburnt fuel-oxidizer mixture. It utilizes repetitive detonations of the fuel-oxidizer mixture to produce thrust.

For flying systems, however, detonation requires a long tube length to accommodate required amount of energy input. TBRL has been working on a system to reduce the length of the engine so that it can be applied in systems like UAVs and other missiles system as well. 'To reduce engine length, suitable devices are employed which reduce the length of the tube required for the transition from deflagration to detonation. A test rig was designed and established for conducting experiments with liquid fuel-air mixtures,' the paper added.

'Developing indigenous pulse detonation technology is a big achievement for Indian scientists. This technology is very important for the cruise, anti-ship missile and UAVs which will be used in manipulating speed and fuel efficiency of the missile or drones,' Rajiv Nayan, a missile technology expert said.

Last year in July-August, Russian scientists had successfully tested the first-ever pulse detonation rocket engine on clean fuel. Apart from Russia, the US became the first to have tested a pulse-detonation engine in 2008, though powering a plane and not a rocket. Since 2008, the US has not reported any further test or development work related to pulse detonation system. ■

(Source : Indian Defence News Bulletin, May 20 2017)

Compiled by S. Ghosh

From page No. 3

letter has re-ignited the debate over how safe it is to consume GM food. The Consortium of Indian Farmers Association has spoken out strongly about its benefits. Still its release is uncertain.

The controversy lies in the apprehension of its potential impact on health and environment. Opponents of GM are concerned with safety of altered food from altered crop as against natural food from natural crop. But how natural is the so called natural food? Nothing we eat now is natural. From cattle to corn, apple to artichokes, to-day's food is the result of cross breeding dating to dawn of history. Many plant varieties we consume to-day did not even exist a century ago. Thus transfer of gene is taking place constantly in Nature and on a magnitude several times higher. Decision regarding safety, therefore, should be based on nature of product rather than on the method by which it was

modified. Many crop plants we use to-day contain natural toxin and allergens. Health hazards from food and how to reduce them are challenges facing all countries, quite apart from any concern about GM technology. On the other hand several fold reduction in the use of insecticide to control bollworm has been recorded in the country with the use of Bt cotton in 95% cotton area. Similar would have been the case in Brinjal, had it not been kept on moratorium. Again India may experience significant increase in yield of mustard oil if the GM mustard is not held up on the basis of apprehension of health hazards ignoring the scientific facts and figures. The key to the future of growing GM crops in India may ultimately rest on the regulatory fate of GM mustard seed. ■

## A Personal Mission Statement

- Succeed at home first
- Never compromise with honesty
- Hear both sides before judging
- Defend those who are absent
- Develop one new proficiency a year
- Plan tomorrow's work today
- Maintain a positive attitude
- Be orderly in personal work
- Do not fear mistakes - fear only the absence of creative, constructive and corrective responses to those mistakes
- Felicitate the success of subordinates
- Listen twice as much as you speak
- Concentrate at abilities and efforts on the task at hand, not worrying about the next job or promotion.
- Seek and merit divine help
- Remember the people involved
- Obtain counsel of others
- Be sincere yet decisive
- Hustle while you wait
- Keep a sense of humour



Sri P. P. Mitra (Retd. IES), former Principal Labour & Employment Adviser, Govt. of India addressing a Get-together meeting at IAPQR

## List of New Members



### Life Members :

- **Sri Suman Kalyan Ghosh**  
Flat No. 228, A-Block, Richmond Lakeview Apartment  
Ramakrishnapuragate, Chandapura  
Bangalore 560 099
- **Dr. Sovan Chaudhuri**  
Associate Professor  
Indian Institute of Management, Kozhikode  
P.O. IIMK, Kunnamangalam, Kozhikode 673 570, Kerala
- **Mr. Sujay Kumar Mukhoti**  
Assistant Professor  
Indian Institute of Management, Indore  
Indore 453 556, Madhya Pradesh
- **Prof. Santanu Ray**  
Steel Chair Professor,  
IIT Madras, Chennai 600 005

## Thought for To-day

If you can dream it, you can do it. — Walt Disney

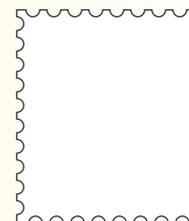
### EDITORIAL BOARD

**Biswanath Das (Chief Editor), H. S. Ray, S. B. Bagchi, S. K. Ghosh, A. Ghose.**

Published by the General Secretary, Indian Association for Productivity, Quality & Reliability, BB-239 (First Floor), Sector-I, Salt Lake City (Off PNB Bus Stand), Kolkata 700 064. Phone : 91-33-2334-6234 / 6233, Fax : 033-2334-6234  
E-mail : iapqr@yahoo.co.in. Website : www.iapqr.org. Printed by Supriya Ghosh, Bally, Howrah.

PRINTED MATTER

BOOK POST



If undelivered, please return to :

**Indian Association for Productivity, Quality & Reliability**

BB-239 (First Floor), Sector-I, Salt Lake City (Off PNB Bus Stand), Kolkata 700 064