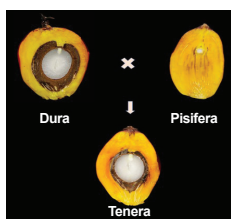


# Seed Tech News



**ISST:**  
**Disseminating Knowledge of  
Seed Science & Technology**

**Volume: 51, No. 2  
April-June 2021**



Oil palm (*Elaeis guineensis* Jacq) is the highest oil yielding crop and provides palm oil (4-6 tonnes/ha) and palm kernel oil (0.4-0.6 tonnes/ha). There are three naturally occurring fruit forms in oil palm viz. Dura (thick shell), Pisifera (Shell less) and Tenera (thin shell). The shell thickness is a monogenic trait and codominant. Tenera is a hybrid between Dura and Pisifera. Tenera is the commercially growing fruit form and provides higher oil yield compared to other two fruit forms. In oil palm hybrid seed production, tenera seeds are produced by crossing dura (female parent) and pisifera (male parent).

## From President's Desk...

Dear Members,

Greetings from the Secretariat!

The Covid 19 pandemic is teaching many vital lessons and throwing new questions every day, making us to ponder on the path of the progress adopted, specially in the last one century. People have come to recognise the importance of respecting and remaining connected with nature for the well-being of all. Every nation is reconsidering their future development plans with more caution, keeping sustainability as the foremost goal. Hence, it is only logical that 'Eco agriculture' is being promoted for sustainable food security globally. It may not be possible to change the complete production and consumption system overnight, but more important is to be conscious about maintaining a natural balance of the ecosystem while providing for food, nutrition and livelihood security.

The Government of India, through the dedicated scheme of Paramparagat Krishi Vikas Yojana (PKVY), is promoting organic farming as a means for ensuring sustainable productivity, food security and soil health. While many states, such as Maharashtra and M.P. are promoting organic agriculture in a big way, eco-agriculture is more than that. It is about sustainable and balanced use of all resources in production system, minimum wastage of the produce and promotion of the concept of 'One Health'. The use of need-based and eco-friendly inputs, region-specific integrated farming system approaches and scientific methods to minimise wastage of agricultural produce as well as conversion of waste to wealth are some approaches, which highlight the 20:20 model, meaning a 20 per cent reduction in input cost with 20 per cent higher productivity. Being the key input in agriculture, seeds of high yielding, nutri-rich varieties are expected to play a vital role in the success of eco-agriculture. To enhance the genetic advantages of improved varieties with desired attributes such as, increased yields, nutrition value, shorter crop durations etc., seeds would need to be treated with appropriate and eco-friendly seed treatments to ensure a vigorous stand establishment and resilience against various biotic and abiotic stresses.

It perhaps will not be out of place to mention that realising the need to adopt eco-friendly farming practices, one of our esteemed fellow seed technologists Dr. RL Agrawal, whose book "Seed Technology" published by the Oxford IBH laid the foundation to seed technology for thousands of seed professionals, did some pioneering work in organic seed production technology. With the recent demise of Dr. Agrawal, the area of organic seed production and certification has lost a leader. However, experiences of the farmers from other countries (such as tea farmers from Sri Lanka), also raised concerns about adopting OA in totality. Perhaps we need to aim for a balanced approach by adapting a system of resource conserving and environment friendly farming than debating on a wholly organic or chemical dependent agriculture. It is hoped that systematic studies in seed research will be undertaken to address the critical issues like weed control and pest management, and enhancement treatments for quality seed production in eco-friendly manner.

Malavika Dadlani

**Secretary** : Sandeep Kumar Lal  
**Chief Editor** : Ashwani Kumar  
**Editor** : Vijayakumar H.P

## EVENTS OF INTEREST

### **Panel Discussion on Strengthening of Public Private Partnership in Seed Production & Research by ICAR-IISS, Mau**

The ICAR- Indian Institute of Seed Science, Mau (Uttar Pradesh) organized a virtual panel discussion on “**Strengthening of Public Private Partnership in Seed Production & Research**” on 22nd April, 2021 to contemplate on present status, issues, prospects and to devise apposite framework for public private partnership in Indian seed sector.

The event was Chaired by Dr. K.V. Prabhu, Chairperson, PPV&FRA, New Delhi and Co-Chaired by Dr. D.K. Yadava, ADG (Seed), ICAR, New Delhi. Dr. Vilas A. Tonapi, Director, ICAR-IIMR, Hyderabad; Dr. M. Prabhakara Rao, President, NSAI, New Delhi; Dr. Ram Kaundinya, Director General, FSIL, New Delhi; Sh. Gubba Kiran, CEO, Gubba Cold Storage, Hyderabad were some of the prominent panelists presented their viewpoints during the discussion.

At the outset, Dr. Sanjay Kumar, Director, ICAR-IISS, Mau welcomed the dignitaries and set the tenor for igniting lively deliberations pertinent to public private partnership in seed sector.

Dr. D. K. Yadava outlined the status, strength, weakness and prospects of public seed sector, in his remarks, emphasized the contribution of ICAR in making robust seed system. Insights pertinent to role of public sector in varietal development, augmentation of seed indices (VRR & SRR), productivity maximization through improved seed, challenges posed by changing climate, need for strengthening of seed system in horticultural crops, minimizing the share of informal seed sector, working in conjunction with private seed sector for augmenting the seed availability, ISTA accreditation of seed laboratories vis-à-vis seed trade, preparedness for new seed bill, assumption of novel seed coating & pelleting technologies, revision of field & seed standards and need for

revision of SMR were adeptly narrated.

Dr. Vilas A. Tonapi in his deliberations on framework for public private partnership in seed production pondered upon issues such as trust deficit, goal commonality & strength complementarity and specified perspective for leveraging partnership in Indian seed domain. Need for sharing of research material, joint R&D ventures and potential areas of collaborations viz. varietal licensing, sharing of infrastructure, exchange & deployment of manpower, technology demonstration & commercialization through FPOs etc. were adroitly accentuated.

Dr. M. Prabhakara Rao skillfully articulated about success stories and way forward for public private partnership in seed production. He reiterated on trust building and healthy partnering is the only way to tread ahead. He stressed on economically feasible-output oriented research programmes that can be easily adopted by farmers and also highlighted the critical role of government policies in facilitating strategic environment for public private complementarity in seed sector.

Dr. Ram Kaundinya briefed about challenges of public and private seed sectors and focused on collaborations with respect to joint research projects for contemporary technologies development, enhancing seed export potential and sharing of facilities should be given utmost priority. He opined that, trust deficit and silo approach & no major cross sharing has been the principal reasons contributing for non-sustainability of public-private partnership ventures in agriculture sector. He also pointed out the need for more integrated approach in product oriented research, market survey, research collaboration in open pollinated crops, development of GM & non-GM traits. Need for setting up regulatory agencies on PPP mode, involvement of food industry with seed industry for promotion of bio-fortified crop varieties and sharing of infrastructure facilities were also highlighted.

Sh. Gubba Kiran deliberated on importance of

core competency and how state of art storage technologies of Gubba can aid in strengthening of seed sector and rendered views on fumigation, pest free seed storage and how seed storage sector can contribute for growth *per se*.

Dr. A. K. Singh, Director, ICAR-IARI, New Delhi deliberated to have structured partnership in seed domain for better product delivery to the farmers.

Dr. K.V. Prabhu in his Chairman's remarks suggested for both public and private sectors should venture into strength complementation thereby enabling an operable regime. He pointed out that fragmented approach, climate irregularities, seed traceability, commercialization of varieties, lack of trust and sharing of research materials are some of the major issues that needs to be addressed in short time scale. He also stressed the need for clustered approach with the creation of common facility through both public and private investment in seed sector along with the framework of clearly defined parameters for sharing of research outputs. He underlined the need for more and more licensing of products from public sector, creation of state of art seed quality assurance labs involving both public & private sector and collaborative projects in the areas of seed production, testing of new varieties and seed export.

Dr. S.A. Patil, Former Director, ICAR-IARI, New Delhi & Chairman, QRT, ICAR-IISS, Mau; Dr. R.R. Hanchinal, Former Chairperson, PPV&FRA, New Delhi; Dr. M. Bhaskaran, Former VC, TNOU, Chennai & Chairman, RAC, ICAR-IISS, Mau; Dr. S.K.Rao, VC, RVSKVV, Gwalior; Dr. Vishnuvardhan Reddy, VC, ANGRAU, Guntur, Dr. J.S. Chauhan, Former ADG (Seed), ICAR; Dr. Malavika Dadlani, Former JD (Research), ICAR-IARI, New Delhi and Dr. Rahul Chaturvedhi, Associate Director (Seed Programmes), PepsiCO, Bengaluru were some of the other notable dignitaries expressed their views during deliberations. Over 215 participants including the leading seed scientists, Nodal Officers of AICRP-NSP (Crops) & ICAR Seed Projects from ICAR institutes & SAUs and representatives from

the NSC, SSCs, SDAs, private seed industry etc. joined the event.

The session ended on a positive note with having an action plan and measures to enable a successful PPP in this endeavor and concluded with vote of thanks by Dr. Udaya Bhaskar K., Sr. Scientist, ICAR-IISS, RS Bengaluru.

## **Following are some of the major recommendations emanated during the deliberations**

1. In a bid to strengthen the seed production and supply system in horticultural crops especially vegetable segment, the framework (breeder seed indentation, commercialization of crop varieties etc.) to be drawn in a way similar to field crops by ICAR in consultation with other stakeholders viz. DAC&FW, NSC, SSCs and private sector.
2. Development of collaborative research projects with well-defined framework for sharing of outputs in the areas viz. development of climate resilient, bio-fortified, multiple stress resistant/tolerant crop varieties, GM traits etc. and in the areas of seed production, testing of new varieties and seed trade.
3. Need was felt to have clustered approach rather than fragmented approach through joint investments of public private collaborators in creation of research facilities, market surveys, product development, quality assurance laboratories, promotion, branding and marketing.
4. Establishment of national and state level market consulting group/ platform involving both the sectors for clear understanding of problems at grass root level and they may also aid in the development of programmes in order to address the identified issues.
5. In order to build enabling environment in seed sector, an independent regulatory agency may be established on PPP basis to look after the issues related with testing of crop varieties, its

commercialization, seed production, quality assurance and marketing. Furthermore, lack of market orientation in research was also felt, hence, same agency may also be entrusted with the responsibility of bridging gaps between the market requirement and defining research objectives.

6. In order to popularize the bio-fortified crop varieties bred by public/ private sector, need was felt to link seed industry with food industry. In this regard, ICAR and its collaborators shall develop a roadmap involving partners from food industry.
7. Both public and private seed sector are investing heavily on development of research infrastructure. Hence in a bid to reduce capital expenditure and maximize capacity utilization, both sector need to develop some sort of strategies for effective sharing of available infrastructures with clear benefit sharing estimations.
8. Need for creation of state of art seed quality assurance laboratories through joint venture in major seed hubs was felt. These seed laboratories shall function as a hub of seed quality assurance for both public and private sector. Similarly, they shall also work on development/ testing of farmers friendly, economically feasible seed production and quality enhancement technologies.

## Capacity building programmes on Seed Technology under the project of Indo-German Cooperation on Seed Sector Development

In the frame of the project 'Indo-German Cooperation on Seed Sector Development', an extensive capacity building programme is being undertaken during 2021 and 2022. The aim of this programme is to improve seed quality by training the trainers of 12 selected states in three agro-climatic zones of India as given below.

- a) **Northern Zone:** (Rajasthan, Punjab, Haryana and Uttarakhand);
- b) **Eastern Zone:** (Odisha, Bihar, Chhattisgarh and Eastern Uttar Pradesh) &
- c) **Southern Zone:** (Telangana, Karnataka, Andhra Pradesh and Tamil Nadu).

In accordance with the regional priorities of seed production, the most important seed crops have been chosen for the capacity building programme.

In view of the Covid pandemic situation the programme is being implemented in virtual mode by a team of well experienced national and international trainers from public and private sectors. There will be a total of 15 training programmes, three in each of the following areas:

1. Seed Production; 2. Post-harvest Technologies for Better Seed Quality; 3. Seed Quality Enhancement; 4. Seed Testing according to ISTA and 5. OECD Seed Certification.

For more information, please visit <http://www.indogermanseedproject.com/>

or contact Dr. Raghavendra Kavali, National Project Coordinator,

Indo-German Cooperation on Seed Sector Development,

Hyderabad. Mob: +91 733 722 5886  
(kavali-raghavendra-adt@outlook.com)



Glimpses of virtual meeting

Source: ICAR- Indian Institute of Seed Science, Mau (UP)

## NEW INNOVATIONS

### Marker assisted seed production (MAP) is realistic in Indian context.

Dhandapani R<sup>1</sup>, Vijayakumar, H.P<sup>1</sup>, Somasundaram G<sup>2</sup>,  
Ambika Rajendran<sup>1</sup> & Rajendra Prasad S<sup>3</sup>.

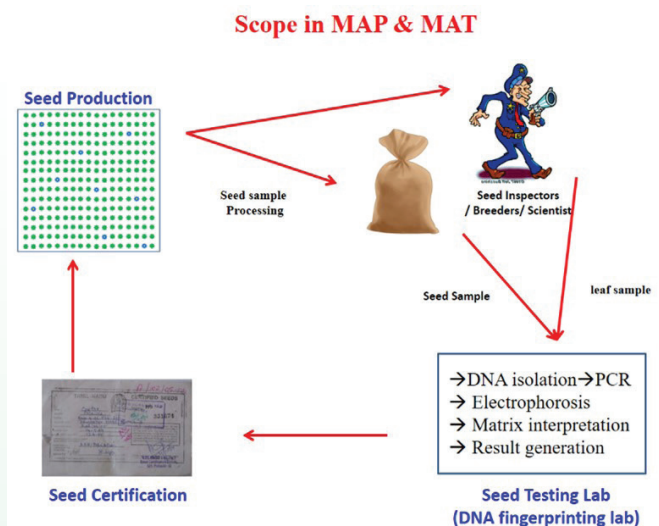
<sup>1</sup>ICAR-Indian Agricultural Research Institute, New Delhi

<sup>2</sup>ICAR- Indian Institute of Oil Palm Research (IIOPR),  
Palode, Kerala

<sup>3</sup>University of Agricultural Sciences, GKVK Campus,  
Bengaluru, Karnataka

Seeds are the most basic and vital input for the sustainability in growth of agricultural production in India. Quality seeds are the seeds that are highly viable, genetically uniform and free from seed borne pathogen. By using quality seeds with enhanced genetic purity, the farm yield can be enhanced by 10-15 %. Among the various seed quality attributes, genuineness of the variety/hybrid is one of the most important characteristics of good quality seed. Maintenance of high level genetic purity of hybrid seeds to exploit the moderate level of heterosis is a major challenge. For instance, it is estimated that for every 1 per cent impurity in rice hybrid seed, the yield reduction is 100 kg per hectare. Moreover, with ever increasing number of seed varieties, the chances of admixture of seeds are high due to post harvest mishandling. Many time seed distributors voluntarily contaminate the quality seed with poor quality seed for profits. The use of seeds with low genetic purity results in segregation of the traits, lower yields and genetic deterioration of varieties. Thus, it is important to maintain genetic purity to provide best quality seed.

In India, seed production activity must be carried out under the strict supervision of the seed certification officials. Assessment of genetic purity is one of the most important tests carried out to certify the seed production field as well as seed lot during each stage of seed production chain. Till date, genetic contaminants / offtypes are visually identified using morphological descriptors (DUS characters) and it is time consuming, labor intensive and subjective decisions are taken. However, DNA



based specific markers are recently developed for genetic purity assessment of diverse crop plants, including GM crops. Moreover, several state level DNA fingerprinting laboratories are already established for assessing the genetic purity of seed lots and trained their certification officials. Several transgenic / variety / hybrid specific markers are already reported and breeders / researchers / students are effectively using those markers for marker assisted breeding.

Hence, there is a need of accurate, cost-effective methodology along with a hand held tool for the seed inspectors to collect the samples in the field and arrive certification decision based on DNA fingerprinting at seed testing laboratory. Three-way bulking technology is one of the novel DNA fingerprinting methodology developed for cost effective testing of genetic purity of crop plants. However, this method involves cumbersome collection and mixing of leave samples in a matrix pattern and there is a need for hand held device to collect and bulk the leaves sample at the seed production or grow out test field. So that, three way bulked samples can be utilized for detection of genetic contaminants in the seed testing laboratory. Similarly, there is a need for hand held device for bulking of seeds arrived at seed testing laboratory. Summary of technologies developed at ICAR-Indian Institute of Seed Science, Maunath Bhanjan, Uttar Pradesh. The technologies are readily

available for commercialization at ZTMBPD unit, ICAR-IARI, PUSA Campus, New Delhi-110012

**Matrix Gun:** Three way leaf sampling device for DNA based genetic purity testing of seed crop

## Utility

- Matrix Gun, a hand held device for molecular breeders'/seed inspectors'/seed producers to conduct leaf based three-way sampling method for testing genetic purity of crop varieties/hybrids/transgenic plants in the field and identify genetic contaminants, if any.
- The device is one among the component of standard operating procedure developed for Marker Assisted Seed Production (MAP)
- An appropriate technology for central referral seed testing laboratory, state seed testing laboratory, DNA finger printing laboratory of public and private seed organisations to conduct Molecular Grow Out Test (Mol-GOT) and tracing the plants originated from contaminated seed using molecular markers.



## Technical Features

- This device is manually operated, ergonomically simple and user friendly machine made with sampling capacity of 400 Mol-GOT plants
- The device primarily comprises of five components leaf sampler (1), matrix sorter (2), roll cartridge (3), tracker (4) and counter (5)
- In a single stroke of the trigger available in matrix gun, the leaf sampler will collect three leaf samples (discs of 1 cm diameter) each from 400 standing crop plants and delivers to matrix sorter

- The movable matrix sorter automatically segregates three samples collected from each plant in such a way so as to form a 20x20 three-way bulk matrix
- Among three leaf samples, two are used for respective row bulking and column bulking. The third leaf sample retained separately, by roll cartridge for further analysis if required or can be stored as guard sample
- The matrix sorter that contains replaceable vials and roll cartridge are removed from the gun and DNA based genetic purity testing is carried out in DNA fingerprinting laboratory
- The tracker in the device labels the plants from which leaf samples are collected for reverse tracking purposes. The device also has a counter to track the number of sample collected on real time basis

## Advantages

- First of its kind device developed to conduct complex three-way sampling of leaf sample, sorting, bulking and labelling from seed production or Mol-GOT field for testing genetic purity of crop varieties/hybrids/transgenic plants.
- It facilitates in reducing the cost, time and labour taken for conducting Mol-GOT experiments at state seed testing laboratory / DNA finger printing laboratory of public and private seed organisations
- The capacity of device to bulk row and column wise leaf sample automatically, even during random sample collection in seed production field is the added merit feature over traditional low-throughput GOT method

## OBITUARY

R.L. Agarwal



(08.11.1944 – 29.06.2021)

Dr. Rattan Lal Agrawal (1944 – 2021) – the revered ‘Guru’ of scientific Seed Technology in India, received his B.Sc. (Ag) and M.Sc. (Ag) degrees in 1962 and 1964 respectively from Agra University (Government Agricultural College, Kanpur) and doctorate from Indian Agricultural Research Institute (IARI), New Delhi in 1969. He received specialized training in seed testing and storage under USAID.

Dr Agrawal started his career at G. B. Pant University of Agriculture, Pantnagar in 1968 where he served till his retirement in 2002 in various capacities. He served as Deputy Director General, U. P. Council of Agriculture Research (1990-1995) on deputation. He was assigned the responsibility for establishing State Seed Certification Agency, and State Organic Certification Agency by the Government of Uttaranchal in 1999. He was appointed Director of the said agency (on deputation from 2000 to 2003). Here he developed a keen interest in organic agriculture while establishing organic certification work. After retirement he provided consultancy for establishing Uttar Pradesh State Organic Certification Agency, including training of personnel engaged in organic certification work. He also visited AAU as Visiting Professor where he was engaged in developing and teaching a course on Organic Seed Production Technology for a short-while.

Dr Agrawal is not only the renowned author of Seed Technology – the most referred book on this subject, but has other equally important books to

his credit, viz., Identifying Characteristics of Crop Varieties, and Fundamentals of Plant Breeding and Hybrid Seed Production published by Oxford & IBH (now by CBS). The latter two books were also published by Science Publishers in USA. He is also credited for publishing two books in Hindi, which won ICAR’s Dr Rajendra Prasad Puruskar (1974-75; 1977-78). His last book ‘Organic Agriculture’ was published by Kalyani Publishers, New Delhi.

In addition, he has published about 30 research papers in national and international journals and many technical reports and bulletins in the area of seed technology and allied fields.

The Indian Society of Seed Technology pays homage to Dr. R.L Agrawal for his outstanding contributions in seed science and technology and pray for eternal peace. The Seed fraternity express deep and heartfelt condolences to his family.

Dr. P. Selvaraju



(15.04.1961 - 07.04.2021)

Dr. P. Selvaraju, sincere and dedicated Seed Technologist and Professor, Seed Centre, TNAU, Coimbatore died on 07.04.2021 due to illness. He started his career in the Department of Agriculture as Agricultural Officer. Then, he joined as Assistant Professor at PAJANCOA & RI, Karaikal on deputation from TNAU during 1989. He worked at various Research Stations of TNAU viz., Agricultural Engineering College & Research Institute, Kumulur; Agricultural College & Research Institute, Trichy; ARS, Vaigaidam; and TNAU, Coimbatore. He also worked as Professor and Head, ARS, Vaigaidam; Professor and Head, Department of Seed Science & Technology, TNAU, Coimbatore; Special Officer (Seeds), Seed Centre; and Director, Seed centre, TNAU, Coimbatore.

He has guided many PG and Ph.D. students and published many research papers. He handled two NADP projects with the budget of Rs. 186.7 lakhs and two seed hub projects on pulses and oilseeds with the budget of 13.5 crores. He served as the Course Director for two ICAR sponsored winter school trainings conducted at Seed Centre, TNAU during 2016 and 2018. He had presented a paper in the International Joint Symposium on Tree Seed Technology held at University of the Philippines, Los Banos. During his tenure as Special Officer (Seeds), Seed Centre, TNAU has received the Best AICRP-NSP (Crops) STR Centre Award during 2018. He was an active life member of ISST from 1998 and attended many Seminars organized by the ISST. New Delhi.

The Indian Society of Seed Technology pays tribute to Dr. Selvaraju for his immense contributions in seed science and technology and pray for eternal peace. The Seed fraternity express deep and heartfelt condolences to his family and pray god to give enough strength to his bereaved family to bear the loss.

**Dr. Rakesh C Mathad**



(22.06.1977 - 13.05.2021)

Dr. Rakesh C. Mathad was young Seed Technologist working at UAS, Raichur. Dr. Rakesh C. Mathad

did his Master's & Doctorate degree programme from University Agricultural Sciences, Dharwad. Before joining University of Agricultural Sciences, Raichur, he worked at Seminis Vegetable Seeds Private Ltd. for four years and Corporation Bank, GoI for three years.

He expired untimely due to ill health on 13th May, 2021. He was a man of total commitment, humility, disarming smile, friendly disposition, extraordinary generosity and deep insights with exceptional contributions – that's how Rakesh C. Mathad will be forever etched in the memories of his colleagues and friends at University of Agricultural Sciences, Raichur and across the various sectors.

While working at UAS, Raichur, he was actively involved in strengthening of seed production activities, providing hands-on-training to Undergraduate students. He also served as Assistant Registrar at Registrar's Office & Technical Assistant at Directorate of Education, UAS, Raichur who is instrumental in preparing various reports required for University Accreditation.

The Indian Society of Seed Technology pays tribute to Dr. Rakesh C. mathad for his excellent contributions in seed science and technology and pray for eternal peace. The Seed fraternity extends heartfelt condolences to his family and pray God to give enough strength to his bereaved family.

## ACKNOWLEDGEMENT

The editorial board sincerely acknowledges the contribution of Dr. Somasundaram, G., Senior Scientist, IIOPR Research Centre, Palode, Kerala for providing relevant information on Oil Palm in the front page of this issue of Seed Tech News.

### NOTE:

All the ISST members are requested to contribute to various columns of Seed Tech News by providing information on a) Awards and Honours received; b) Upcoming trainings/ events; c) Recommendations of scientific gatherings; d) Latest research findings etc. In addition, brief technical notes may also be submitted for fast dissemination.

*Seed Tech News is provided on complimentary basis to the subscribers of 'Seed Research'*

Compiled & Edited by **Dr. Vijayakumar, H.P** and Published by **Indian Society of Seed Technology**,  
F-5, First Floor, A Block, NASC Complex, Dev Prakash Shastri Marg, New Delhi 110 012

e-mail: [seedtechnews@gmail.com](mailto:seedtechnews@gmail.com)

Venus Printers and Publishers, New Delhi, Mobile : 98100 89097, E-mail: [pawannanda@gmail.com](mailto:pawannanda@gmail.com)

**ISST Registration No.: 21893/71**