Brainstorming Session on “R&D Issues in Post-Harvest Processing and Value Addition in Millets: Future Road Map through Consortium mode”

ICAR - Indian Institute of Millets Research organized a Brainstorming session on “R&D Issues in Post-Harvest Processing and Value Addition in Millets: Future Road Map through Consortium mode” on 19 December 2018. The main objective of this meeting was to form a research consortium to channelize expertise from various premier institutions in the country. The consortium involves senior expert members Dr. NG Malleshi, Former Principal Scientist, CFTRI, Mysore, Dr. Venkat Reddy, Head, R&D, Naga Foods P. Ltd, Prof. PS Rao, IIT, Khargpur, Sh. Siddarth Singha, IIT, Gauhati, Prof. SN Naik, IIT Delhi, Dr. Meera form CFTRI and others from reputed institutions.

The meeting mainly focused on issues and challenges in millets processing, value addition technologies and try to find solution and actionable points. During the program IIMR showcased its achievements, current activities and future concern as far as millet processing and value addition is concerned. On the other hand, members shared their expertise and presented proposal on specific area to solve major issues faced during millet processing and product development. The program led to strong research collaboration (MoU) with selected industry partners. Dr. B Dayakar Rao, CEO, Nutrihub, and Dr. Sangappa, Scientist, IIMR were the coordinators of this event.

National Seminar on “Future Challenges in Agriculture, Value Addition to Millets/ Food Crops and their Nutraceutical function”

One day National Seminar on “Future Challenges in Agriculture, Value Addition to Millets/Food Crops and their Nutraceutical function” was organized by Indian Institute of Millets Research, Hyderabad in association with NABARD at Bapatla Engineering College on 17 December 2018. The seminar was hosted by the Bapatla College of Pharmacy. The technical sessions mainly covered topics related to Millet crop production systems, their nutritional value, Entrepreneurial development and start up related initiatives. In this event about 300 delegates participated enthusiastically. Various millet food products were also displayed in exhibition stall organized by IIMR. The inaugural session was chaired by Sh. B Suribabu, GM, NAABARD. Sri Muppalaneni
Seshagiri Rao, President of Bapatla Educational Society (BES) was the chief guest. Sh. KRD Kartheek, DDM, NABARD, Guntur, Andhra Pradesh, Manam Nageswara Rao, Secretary, Bapatla Education Society, Dr. SS Rao, Principal Scientist and Dr. B Subba Rayudu, Principal scientist were on the dais.

Speakers from various institutions including Home Science College, Bapatla and Food Science and Technology College, ANGRAU, and Scientists from IIMR, Hyderabad enlightened the gathering and cleared their doubts. Sh. B Suribabu, NABARD, Guntur assured support from the bank to the budding Agriculture entrepreneurs and Farmers. Drs. SS Rao, S Ravi Kumar, P Sanjana Reddy, B Subbarayudu, Ch Sashidhar Reddy, M Elangovan, G Shyam Prasad, B Amasidda and R Venkateswarlu from IIMR and Smt. Saraswati, SABALA-NGO, Kothavalasa interacted with the participants. This program was coordinated by Dr. B Subbarayudu, Principal Scientist, IIMR, and also GM of NABARD sponsored project on millets in association with Dr. TEGK Murthy, Principal, College of Pharmacy, Bapatla. In the event, about 30 progressive farmers were felicitated with Rythu Mitra Awards. Local Press and Media covered this entire event.

Training Program on “Start-up Ignition: Entrepreneurship Opportunities in Millets”

ICAR-II MR organized an event on “Start-up Ignition: Entrepreneurship Opportunities in Millets” at ICAR-II MR on 17 December, 2018 at Nutrihub. To create awareness about the importance of millets, insight on Start-ups, Entrepreneurship Opportunities and business opportunities in millets sector. A group of 28 participants were attended with diversified background including farmers, housewives, millets entrepreneur aspirants and start-ups. In the beginning, Dr. Sangappa, Scientist, welcomed the dignitaries and participants, he also given overview of program. Later Visited to Centre of Excellence & Millets processing centre. Mr. B Srinivas, Incubation Manager, Nutrihub briefed the funding opportunities to new entrepreneurs. Dr. B Dayakar Rao, CEO Nutrihub highlighted importance of millets. Program was concluded with distribution of Millet Value added products Kit.

Short term Training Program on “Course Baking & Snacks Food Technology of Nutri-cereals”

ICAR-II MR organized Short-term Course on Baking & Snacks Food Technology of Nutri-cereals” at ICAR-II MR on 17 – 21 December, 2018 at Nutrihub. The course was organized to create awareness on bakery technologies in millets. About 10 participants attended program with diversified background. Faculty from IIT Khargpur, Indian Institute of Packaging Institute, Hyderabad and other resource persons delivered the sessions. In five days course they learnt many aspects on snacks and bakery products. Dr. B Dayakar Rao, CEO, Nutrihub was the Course Director for the event and Dr. Sangappa, scientist was Co-Course Director. Dr. P Soumya Ranjan and Mr. B Srinivas coordinated the event.

Millet Stall on Agri Educational Day

ICAR-II MR organized an exhibition stall during “Agriculture Educational Day” organized at Professor Jaya Shankar Telangana Agriculture University, Hyderabad on 03 December, 2018. More than 500 Students visited the stall. The visitors showed keen interest especially on the innovative food products developed from sorghum and other millets. The importance of millets as health and nutritious food was explained to the visitors and relevant literature was distributed.

Millet Stall at National Seminar

ICAR II MR organized an exhibition stall during "Sustainability of small farmers" seminar organized at Professor Jaya Shankar Telangana Agriculture University, Hyderabad on 22 December, 2018. More than 150 members including University professors, retired staff and AICRP staff visited the stall. The importance of millets as health and nutritious food was explained to the visitors and relevant literature was distributed. The visitors showed keen interest especially on the innovative food products developed from sorghum and other mil-
be based celebrated millets choices, in other ancheruvu ICAR Over Millet Walkathon lets.

Millet Walkathon – WINTERHALF-2018

Nutrihub, the business incubator of Indian Institute of Millets Research in partnership with Peerancheruvu Runners (PCR) 20 km running event entitled WINTERHALF-2018 marathon for millets popularization as nutricereals and create consumer awareness about millets health benefits on 2 December, 2018. The Indian Institute of Millets Research supported this event as this is the National Year of Millets, the run was promoted as the special "Millet Edition". The Winter Half-2018 encouraged residents in the PBEL City and other communities in Peerancheruvu area to take part in running as a means to promote an active and healthy lifestyle and awareness on millets. About 100 active runners from the PCR group were trained for 10-weeks to be able to run comfortably.

Over 1200 participants registered and took part in the event including 200 children. There were over 80 volunteers from the PCR running group who supported the event. All contingencies were taken care including Police permissions for the event and ambulance services with paramedical supporting staff made available. Continuing with the tradition of promoting healthy choices, runners were provided with a nutritious millet based breakfast at the end of the run at IIMR. Drs. Sangappa, Scientist and V Ravi Kumar, STA & PRO coordinated this event.

Agricultural Education Day Celebrated

ICAR – Indian Institute of Millets Research, Hyderabad celebrated Agricultural Education Day on 03 December 2018, the birthday of the first Indian union agriculture minister and the first President of Independent India, Bharat Ratna, Dr. Rajendra Prasad - for school children to develop interest in agriculture and allied sciences and to select 'agriculture' as their professional and research career or engage themselves in farming as Agripreneurs.

About 80 Students from four schools - TIME School, Bandlaguda, Bharatiya Vidyabhavan School, Spring Field High School and St. Adams High School from Rajendranagar participated in this event. Class room lectures were delivered by Dr. S Ravi Kumar, Sr. Scientist on "Agriculture as a professional Career" and Dr. M Elangovan spoke on “Indian Biodiversity”. To mark this event, IIMR also organized a series of competitions such as Debate, Essay writing, Quiz, Drawing and Painting for the school children. Prizes were distributed to the winners by the In-charge Director, IIMR Dr. SS Rao. A team of IIMR scientists comprising Drs. PG Padma, KBRS Visarada, C Aruna, Hariprasanna K, Deepika C, KN Ganapathi, Sooganna, M. Elangovan adjudged the prize winners under various categories of competitions. Dr. V Ravi Kumar, PRO of IIMR was the coordinator of this event.

World Soil Health Day

ICAR – Indian Institute of Millets Research, Hyderabad organized World Soil Day on 05 December, 2018 to focus attention on the importance of healthy soil and ad-
vocating the same for the sustainable management of resources with healthy soil as edifice for food and nutrition security.

**National Workshop on Digital Field Book at CCSHAU-Hisar**

National Workshop on Digital Field Book, organized by Choudhary Charan Singh Haryana Agricultural University (CCSHAU), Hisar and ICAR-Indian Institute of Millets Research (IIMR), Hyderabad on 10 December 2018. The coordinators were Drs M Elangovan, Phogat and Pummy Kumari. Participants were newly inducted scientists of CCSHAU and scientists and research scholars from other departments. Lecture on Digital Field Book was delivered followed by hands on training with suitable problem solving examples from rice and other crops.

**Recognition**

**Dr AV Umakanth**, Principal Scientist, IIMR has been elected as Fellow of the Indian Society of Genetics and Plant Breeding. He received this award on 14 December, 2018 at Delhi. IIMR Family Congratulates Dr. Umakanth for this achievement.

**Award for IIMR**

ICAR - Indian Institute of Millets Research was recognized by ICAR for its successful compliance of publica-

ons at KRISHI portal and received Award certificate at the Krishi nodal officers meeting held at ICAR during 4-5 December, 2018. Dr. KBRS Visarada, Principal Scientist, IIMR received this award from Dr T Mohapatra, Secretary – DARE and DG, ICAR.

**Guest lectures**

**Dr. KBRS Visarada**, delivered a lecture on MILLETS- THE NUTRI-CEREALS FOR FOOD SECURITY AND CLIMATE CHANGE at at the international conference on Food security, challenges and opportunities (ICFS 2018) held at the Thapar Institute, Patiala during 7-8 Dec 2018. The state scientific council of Punjab expressed interest in promoting millets in the state of Punjab.

**Dr. M Elangovan**, Principal Scientist, IIMR delivered lecture on Digital Field Book at the Training Course on Contemporary Approaches to Plant Genetic Resources Management at ICAR-National Bureau of Plant Genetic Resources, New Delhi on 11 December 2018. There were 25 participants. Dr RS Paroda, President, ISPGR graced the occasion and interacted with the participants.

**Dr. Parashuram Patroli**, Scientist (Plant Breeding), CRS (ICAR-IIMR), Solapur delivered lecture as Chief Guest on “Role of Plant Breeding and Biostatistics in Agricultural science” in state level workshop on B. Sc. III (CBCS Pattern) syllabus Discussion in Botany organized by Department of Botany, DBF Dayanand College, Solapur on 22 December 2018.

**Resource person**

**Dr. Parashuram Patroli**, Scientist (Plant Breeding) acted
as a resource person in state level workshop on B. Sc. III (CBCS Pattern) syllabus Discussion in Botany organized by Department of Botany, DBF Dayanand College, Solapur on 22 December 2018. He trained a group of 20 teachers from different colleges of Maharashtra on floral biology studies of Sorghum and Pearl millet, emasculation and pollination techniques, Hybrid seed production technology, estimation of heterosis, Male sterility by pollen staining techniques and plant breeding strategies in sorghum in one-day workshop. Dr. Parashuram Patroli organized the visit to CRS, Solapur as a part of workshop and above techniques and procedures were demonstrated in detail at the centre.

**New Appointment**

Sri Prashant Bhasaheb Bhusari joined the Indian Institute of Millets Research, Hyderabad as Technical Assistant (T-3) on 24 December, 2018. He has been qualified and selected through the All India level examination conducted for ICAR by ASRB. We wish all the best to Sh. Prashant and welcome him to the IIMR Family.

**“KRISHI RATNA” & “RYTHU MITHRA” Awards**

Dr. B Subbarayudu, Pr. Scientist, IIMR received “KRISHI RATNA AWARD” and Drs. SS Rao, S Ravi Kumar, G Shyam Prasad and M Elangovan, Pr. Scientists and Raghunath Kulkarni, Senior Technical Officer received “RYTHU MITHRA” Awards for their contributions towards the promotion and popularization of millets in India and collection of 3000 plant genetic resources in the country during the NABARD Sponsored National Seminar “Future Challenges in Agriculture, Value Addition to Millets/Food Crops and their Nutraceutical function” on 17 December 2018 at Bapatla Pharmacy College, Bapatla, Andhra Pradesh.

**Execution of ‘Swachhata Pakhwada’**

As per the ICAR directives, ICAR-IIMR organized the Swachhata Pakhwada program as a part of National Swachhata Mission from 16 to 31 December 2018. During this period the activities undertaken were: Cleanliness and sanitation drive within campuses and surrounding including residential colonies, common market places and villages adopted under the Mera Gaon Mera Gaurav programme, white washing of different buildings, and auction of obsolete furniture already identified.

**Activities in villages:** IIMR staff along with villagers actively participated at the Himayatsagar village panchayat cleaning drive and removed the waste materials and created awareness about sanitation and hygiene. Similarly, IIMR staff and farmers of IIMR adopted village Sarpanapatli actively participated in cleaning of village sewerage lines around panchayat office and educated the school children about the awareness on sanitation, hygiene and safe disposal of biodegradable and non-biodegradable wastes.

**Activities in IIMR-Sub-centres:** On the other hand, this programme was implemented at IIMR’s Off-season Nursery at Warangal and Centre on Rabi sorghum at Solapur on 26 and 27 December, 2018. All the staff members actively involved in removal of waste and cleaning of campus.

**Organizing competitions for school children:** About 200 School children from four different schools namely Adarsha Public school, TIME school, Bharatiya Vidya Bhavan School and Krishi School, PJSTAU, Rajendranagar invited to the IIMR campus on 08 December, 2018. They were taught about the objectives of Swachhata Abhiyan and PM’s vision about clean and green India. During this event, Quiz, Essay-writing and Drawing competitions were also conducted on Swachhata activities and Prizes were distributed to the merit students.

These program were coordinated by the Dr SS Rao Principal Scientist & Nodal officer, SBM, IIMR in association with Dr. V Ravi Kumar, STA & PRO, IIMR.

**Memorandum of Agreement**

Memorandum of Agreement between ICAR-IIMR and
M/s Desi seed producer company, Musuru was signed on 04 December, 2018, for procurement of Small Millets during 2018 rabi. Dr Vilas A Tonapi, Director – IIMR on behalf of IIMR and Sh. D Vidyasagar, Director on behalf of M/s Desi seed producer company, Musuru signed and exchanged the agreement. The agreement signing was facilitated by ITMU unit represented by Dr C Aruna, Principal Scientist and Dr. Sangappa, Scientist, IIMR.

Visitors

Visit of Sh. Sourabh Garg

Sh. Sourabh Garg, Secretary to Government of Odisha along with Dr. PK Mishra from ICAR-Indian Institute of Soil & Water Conservation, Dehradun, Visited IIMR on 11 December, 2018. Dr. SS Rao, Director in-charge, IIMR, briefed the visitors on the on-going research and value addition programmes of nutricereals at the institute. Several IIMR scientists participated in the deliberations and provided inputs. The visitors were keen to collaborate with IIMR for aspects related to dryland agriculture, climate change, capacity building in value addition, establishment of hire centre for food processing technology cluster, setting up nutricereals kiosks in strategic locations, etc. The team also visited the Gene Bank, value addition and food processing laboratories of IIMR. Already MoU has been signed by IIMR with Government of Odisha to support the millet Mission programme.

TNAU College Students

A group of 44 B.sc II year Students visited ICAR-IIMR on 03 December, 2018 from Tamil Nadu Agricultural University (TNAU), Coimbatore, Tamil Nadu. Mr. Srinivas, Incubation Manager, briefed the activities of Nutrihub later they visited Primary Processing unit and food processing lab. A group of Students showed keen interest in processing of small millets at farm gate. Dr. Sangappa, Scientist, briefed the institute activities coordinated this event.

Tamil Nadu Farmers

A group of 20 Farmers visited ICAR-IIMR on 5 December, 2018 from Tirunelveli district of Tamil Nadu state under ATMA project. Dr. Sangappa, Scientist, briefed the institute activities and later demonstrated Millets processing and value added technologies at food processing lab. Mr. Manoj, Technical Assistant, Nutrihub interacted with farmers in Tamil. A group of Farmers showed keen interest in processing of small millets. They were given technical Know-how of millets production also. Dr. Sangappa, Scientist, coordinated this event with help of staff, Nutrihub.

FTF- ITT trainees

National Institute of Plant and Health Management (NIPHM), Hyderabad conducted Training Program on Feed the Future India Triangular Training Programme. As a part of this training, a group of 22 executives of 8 countries with officials of NIPHM visited the ICAR – Indian Institute of Millets Research on 6 December, 2018 to understand the production technologies of drought tolerant millets and its utilization. Trainees appreciated the millets value added products and shown keen interest to promote millets product in their country. Trainees also appreciated the recent technologies, advancements and extension approaches in millet production and value chain. Dr. Sangappa Scientist, IIMR coordi-
nated this visit.

**Tamil Nadu Farmers**

A Total of 60 farmers from Tamil Nadu in three groups of 20 each from Salem, Aundipatti, Dindugal and Tiruvannamalai districts visited IIMR on 11, 12 and 13 December, 2018 respectively under ATMA Project. For all the above groups millets recipes also demonstrated. They were taken to millet fields and were given technical Know-how of millets production. Dr. Sangappa, Scientist, briefed the institute activities and later demonstrated Millets processing and value added technologies at food processing lab with the support of Mr. Manoj, Technical Assistant and Ms. Hima Bindu, Senior Research Fellow, Nutrihub.

**Progressive women farmers to CRS, Solapur**

A group of 40 progressive women farmers along with officials from Department of Agriculture, Government of Karnataka visited Centre on Rabi Sorghum (ICAR-IIMR), Solapur on 20 December 2018. During the visit they were explained about improved package of practices for Rabi sorghum and millets cultivation, health benefits and scope for millets cultivation. Dr. Parashuram Patroti, Scientist, organized field visit, they were taken to visit different sorghum experimental plots, seed production blocks of Sorghum, foxtail, proso and little millet, millets crop museum and demonstration plots of improved sorghum varieties. Later problems faced by the farmers and solutions for the same were also discussed in the interactive session.

**Award of ISO 9001:2015 for IIMR**

ICAR - Indian Institute of Millets Research received the ISO 9001:2015 certification for the quality management system. The certificate of compliance has been assessed by the external agency M/s Integrate quality certification Pvt. Ltd and issued certificate on 10 December, 2018 and it will be valid up to 09 December, 2021.

**Dr. Trilochan Mohapatra**, Director General, ICAR, New Delhi visited to Vasanthrao Naik Marathwada Krishi Vidyyapeeth, Parbhani on 26.12.2018 to attend the 22nd convocation programme as chief guest. He visited Breeder Seed Production plot of newly developed Iron and Zinc rich sorghum variety Parbhani Shakti (PVK 1009) planted at Central Farm, VNMKV, Parbhani. He suggested that the grains of “Parbhani Shakti (PVK 1009)” can be utilized for development of processed products specially for tribal area for combating malnutrition of child and woman.

**Organization of one day workshop**

On the occasion of National Nutricereal Day one day workshop on “Importance of Sorghum in Diet and Value Added Products from Sorghum” was organized on 16.11.2018 by Sorghum Research Station, VNMKV, Parbhani in tribal area at Wai Tq. Kalmnuri Dist. Hingoli under TSP project on this occasion we have published one leaflet on “Arogyavardhak Jowariche Aharatil Poshtic Mahatva Mulyavardhit Padarth” in Marathi. During this programme we have educated to the farmer regarding importance of sorghum in daily diets and impact on human health.
Fall army worm, Spodoptera frugiperda (J.E. Smith) in Millet crops

Drs G Shyam Prasad, K Srinivasa babu, PG Padmaja, A Kalaisekar, B Subbarayudu and VA Tonapi

Fall Army worm (FAW), Spodoptera frugiperda is native to Americas and is distributed throughout the Western Hemisphere from Southern Canada to Chile and Argentina. It invaded Africa in 2016 and subsequently it spread to sub-Saharan Africa invading 44 countries by 2018 (www.cimmyt.org). In the absence of any control measures, FAW was predicted to cause 21%-53% loss of the annual maize production in Africa (Day et al. 2017). FAW is polyphagous feeding on over 100 recorded plant species belonging to 27 families (Goergen et al. 2016). However, it prefers plants from Gramineae family including many economically important plants such as maize, sorghum, sugarcane, rice, wheat etc.

To add to the woes the Fall Armyworm (FAW) has invaded India and is causing severe damage to maize in Southern states. It has been reported for the first time in May 2018 in Karnataka. By this time it has spread to the states of Karnataka, Tamil Nadu, Andhra Pradesh, Telangana, Maharashtra, West Bengal and Bihar. FAW presents a major challenge to small holder maize farmers and the feed and processing industry sectors, the largest consumers of maize. However, to add to the problem sporadically FAW has been reported affecting millet crops as well. Thus, threatening the food as well as nutrition security of the country as whole.

The pest was closely monitored in sorghum, Pearl millet and small millets (Barnyard, finger millet) and the damage ranged from 1-2 % during kharif and it was sporadic. But the rabi sown crop during i.e September – October has experienced medium to severe damage during October-November (Fig.1). The young larvae of FAW feed on the opened leaves by scraping and skeletonising the upper epidermis leaving silvery transparent membrane. Later on, larvae enter into the whorl and start feeding between the leaves voraciously resulting in irregular cuts. On an average 1-2 larvae were found in each whorl.
The observations recorded indicated that among the millets sorghum was most preferred followed by Pearl Millet, Barnyard millet and Finger millet suggesting that the severity of infestation was due to overlapping generations as evident from presence of first, third, fourth, fifth instars and adults. The sudden outbreak of the pest is also attributed to the vacation of maize crop present in the vicinity. However, multiple management options tried to contain the pest, which were found to be very effective. However, the second damage assessment after management measures revealed reduction in crop damage on sorghum crop in the range of 18 to 40 per cent. Though, the present season was the first season where in this pest was noticed and worked on, further studies are required to understand bionomics and IPM strategies to be followed.

Following are the management options suggested to manage the pest:

- Collection of egg masses and larvae and destruction.
- Deploy pheromone trap @ 8/acre to monitor pest.
- Alternatively apply mixture of sand (10kg) and lime 50 grams and apply in the whorls. The quantity varies depending on the stage of the crop.
- Deployment of Tricho cards available with state biocontrol laboratory.
- When incidence is low or at early instar stage, spray azadirachtin 5 % (neem based insecticide) @ 0.5 ml per liter of water.
- Spraying with fungal pathogen, Nomurea rileyi @ 2 grams per liter of water.
- In case of presence of late instar larvae baiting is suggested with fermented mixture of rice bran (50 kg), jaggery (4 kg), water (8 liters) and Chloropyriphos 20 EC (500 ml).

Preparation of bait:

- Spread 50 kg of rice bran on the floor, to that add 4 kg of jaggery dissolved in two litres of water and sprinkle on the bran evenly.
- The required quantity of insecticide is dissolved in two litres of water and sprinkled on the bran.
- Pour, 4 litres of water into the mixture and mix properly wearing gloves.
- Transfer mixture to a gunny bags and hold for 48 hours for fermentation.
- Thereafter apply the prepared bait during evening hours into the plant whorls where possible and sprinkle on the ridge.

In case of severe infestation as a last resort spray crop with Emamectin benzoate 5 SG @ 0.4 grams per liter water or Chloroantriprinole 18.5 @ 0.3 ml/lit of water or Flubendamide 20% WG@ 0.4 ml per lit of water. Spray should be done using high volume sprayer (Knapsack) preferably in the morning or evening and spray is to be directed towards the whorls. The subsequent spray may be taken up after 10 -15 days depending on the severity.
### Meetings (M) / Symposia (S) / Workshops (W) / Trainings (T) / Conferences (C) attended

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<th>S. No</th>
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<td>Charles Ekka &amp; Mahesh Kumar</td>
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<td>Mini Symposium on “Advanced Genomics and Breeding Technologies for Accelerating Genetic Gains”</td>
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<td>Parashuram Patroti</td>
<td>State level workshop on B. Sc. III (CBCS Pattern) syllabus Discussion in Botany</td>
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<td>22 Dec., 2018</td>
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<td>New Delhi</td>
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**Thought for the month**

*Develop a passion for learning. If you do, you will never cease to grow.*

*Anthony J. D’Angelo*