



From Right: Mrs. V. Vedakumari, Dr. K. Vidyasagar, Sri. D.J. Rao, Prof. P. Rama Rao, Dr. T. Jyothirmayi Prof. M. Ramakrishna Rao, Mrs. Farida Hussain, Mrs. R. Shyamala, Sri P. Mohanaiah, & Sri Ch. Srinivasa Rao

During the Governing Council Meeting held on 30th March 2019, Dr. K. Vidyasagar, Member, Governing Council and Vice President, SEED has indicated his plans to proceed on a sabbatical to USA from 17th April 2019. Prof. Rama Rao garu, Chairman and Members of the Governing Council have extended their warm greetings to Dr. Vidyasagar for a very successful and eventful stint during his sabbatical in USA. Prof Ramakrishna Rao, Founder SEED recalled his long and eventful association with SEED and the great contributions he made in operationalizing SDF as a founding member. The Council expressed its appreciation and thanked Dr. Vidyasagar for his invaluable contributions to SEED and SDF and requested him to continue to guide the organization even while being in USA as well as after returning to India.

Dr Vidyasagar reminisce his long and eventful association with SEED and its many activities and expressed his happiness to continue to closely associate and contribute to the growth and development of SEED and SDF in future as well.

SEED 32



WE ARE HAPPY TO ANNOUNCE THAT SOCIETY FOR ENERGY, ENVIRONMENT AND DEVELOPMENT (SEED) HAS COMPLETED 32 YEARS OF EVENTFUL CONTRIBUTION TO THE CAUSE OF PROTECTING ENVIRONMENT AND IMPROVING QUALITY OF LIFE THROUGH APPLICATION OF SOLAR ENERGY FOR FOOD PROCESSING.

Mrs R Shyamala Gen Secretary SEED and Managing partner of SDF has been felicitated with "Successful Entrepreneur Award" by WEAIM on the Women's day 7th March, 2019 at Hyderabad.

This honor was conferred for her outstanding contribution in successfully establishing India's first Incubation Center for Solar Food Processing and for successfully operationalizing Solar Dryers & Foods a commercial organization for manufacturing and marketing of Solar Dried food products.



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SEED - VISION 2025 FOR SUSTAINED GROWTH AND DEVELOPMENT THROUGH NEW PRODUCT AND PROCESS INNOVATIONS

Society for Energy, Environment & Development (SEED), an NGO, was established in 1987 at Hyderabad. The main objective and focus of the NGO is to enlarge the use of Solar drying technology by integrating with process and product development protocols for realizing the twin advantages of value addition to agri-horticultural produce and minimizing post-harvest losses. SEED is constantly involved and committed to developing low cost processing technologies for fruits and vegetables using renewable solar energy. Small and medium scale enterprises based on solar drying offer great sustainability and financial benefits to farmers by way of significant value addition and reduction of carbon foot print. These will greatly help small holder farming to be more remunerative and profitable.

The innovations at SEED resulted in the development of solar cabinet dryers of six models (8 kg - 50 kgs). In the solar cabinet dryers the rise in temperature and the temperature gradient is essentially due to green-house effect. Maximum efficiency of dryers is achieved with solar exhaust fans. Hence, they mitigate the climate change. It is estimated that emission of 3.24 MT of CO₂ is eliminated per every MT of fruit when processed in Solar cabinet dryers as compared to traditional fossil fuel based energy systems. Currently there are 264 solar cabinet dryers' in operation in India and abroad that produce about 220.70 MTs per annum of fruit jelly/bars. This results in reduction of 744 MTs of CO₂ per annum from 735 MTs of fruits consumed. Use of solar dryers which reduce requirement of electrical power is saved as 1604MWh annually. The current innovations of 'SEED' are encouraged by the Government of India as grants-in-aid and for technology transfer projects. Other agencies offer financial support for development of products. A Social Enterprise (Solar Dryers & Foods LLP) was started under this

organization as a profit making enterprise to market solar cabinet dryers and solar food products.

Taking into consideration the changing consumer perceptions and future technology needs it is imperative to reorient the organization structure and goals from the points of technology upgradation and process optimization.

The following suggestions need active consideration to enable the enterprise meet the technological sufficiency and financial viability while meeting the future consumer needs of products and quality. The suggestions are more illustrative and not exhaustive.

a) Food Engineering:

- 1) Scaling up capacity of Solar cabinet dryerto 1 MTper charge.
- 2) Development of Hybrid Solar Cabinet Dryers.
- 3) Development of simple innovative food processing equipment to run on Solar Energy.

b) Research & Development:

- 1) Collaborative projects with premier research institutes, universities and NGOs.
- 2) Strengthening of incubation centers.
- 3) Development of manuals on hygiene, food safety, analysis parameters.

c) Solr Dryers & Foods LLP:

- 1) Participation in food parks highlighting usage of Solar Energy for food processing.
- 2) Aggressive marketing of solar food products.
- 3) Conducting skill development programmes.
- 4) Entrepreneurship development programmes for establishing solar food processing centers.
- 5) Sale of solar cabinet dryers through advertisements in electronic, digital and print media.

Dr. K. Vidyasagar

Entrepreneur Development Programme on Solar Food Processing
-Value addition to Fruits & Vegetables
(29th Jan -1st Feb2019)

An entrepreneur training and development program was held at SEED Training and R&D Facility, Hyderabad from 29th January to 1st February, 2019 as part of SEED's continuing education and skills development initiative for capacity building in Solar food processing sector.

The program was participated by 18 participants from a broad cross section of professional interests -- aspiring entrepreneurs, farmers, students of food science and technology from Universities, food industry representatives and software engineers who are aspiring to enter Solar food processing sector.

The programme was designed to cover in detail the 'Know how' and 'Do how' aspects around the programme theme. The theoretical part covered basic and applied aspects of Solar energy applications in food processing, basic food processing operations, nutrition and nutraceutical aspects of fruits and vegetables, quality management, packaging, marketing, business models and Finance etc.

The participants went through the 'Do how' sessions with practical hands on experience of processing tomato, carrot, moringa leaves and fig. The faculty consisted of eminent scientists and subject matter specialists from SEED and other collaborating Institutions like CFTRI, NIN, IIP etc.

All the participants have appreciated the content and coverage. Some of the participants showed keen interest in establishing small and medium enterprises based on Solar Drying. The feedback from the participants is encouraging.

With this training program, SEED conducted four training programs in this financial year 2018-2019 and trained more than 100 entrepreneurs. Apart from these training programs SEED also conducted awareness program and demonstration visits to more than 200 people from other allied organizations.

(Contributed by Ms. R. Shyamala, Gen. Secretary, SEED and Coordinator, Training and Development)



Minor Fruits And Vegetables For Major Value Addition
Development of Healthy Jamun Fruit Bar

Consumer's growing interest in health and wellness is reflected in increased consumption of nutrient and nutraceutical rich fruits and vegetables. Till now the focus of producer and processing industry has been largely on major fruits and vegetables. The trend is changing in recent times mainly towards greater utilization of minor fruits, in recognition of their nutritional and nutraceutical benefits. Processed products based on minor fruits like Jamun, Sapota, Guava are now increasingly available in the market.

Among several tropical fruits in India, Jamun (Syzygium cuminii), a potentially important indigenous minor commercial fruit as well as have high nutritional and nutraceutical uses. It is rich in antioxidants. The fruits nutraceutical constituents like jamboline, ellagic acids, resin, albumen, gallic acid, essential oil and tannic acid. Fruits are used in treatment of pimples emaciation, prickly heat, diabetes Insipidus, urinary system to cure number of diseases such as urinary tract infections, cystolithiasis, dysuria.

Indicative Nutritional Information	
Parameters	Jamun Fruit Roll
Moisture (%)	12.04
Ash (%)	2.24
pH	3.5
Protein (%)	0.98
Ascorb ic Acid (mg/100g)	83
Vitamin A(IU)	1.67
Polyphenol (mg GAE/g)	465.2
Fibre (%)	0.99
Anthocyanin (mg/100g)	368
Calcium (mg/100g)	145
Iron (mg/100g)	6.7

Jamun is seasonal crop and its harvesting time is short and limited to 30–40 days. To mitigate the problem of short season and high post harvest losses, processed and value added products were developed.



SEED has developed value added technology to convert the Jamun fruit pulp into ready to eat and nutritious bars, with zero energy cost using Solar drying process.

Preparation of Pulp: Fully matured, soft and fresh jamun fruits were selected, washed thoroughly and pulp was extracted by using pulper. Jamun pulp was heated at 90±50C while stirring with an automatic pot stirrer.

Jamun Fruit Bar: The basic ingredients of this fruit bar are Jamun fruit pulp, pectin, sugar, water, glucose syrup and Class II preservatives. Fruit puree and sugar syrup were mixed in a blender for 2 minutes before adding the other ingredients. The Jamun fruit mixture was poured into stainless steel trays and then dried in a solar cabinet dryer at a temperature of 55 to 60oC for 10-12 hrs. The leathery structure was formed with a moisture content 12% in the final dried product (Jamun fruit bar) and packed in suitable packing material for long shelf life. Jamun fruit bar is a good source of antioxidants and nutraceuticals.

Dr. Y. Sreenivasulu