

Science and Technology Reporter

A Quarterly Newsletter of the Haryana State Council for
Science and Technology

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EDITORIAL

Science and technology have been integral to the Indian Culture. It was India, who gave the world, the concept of zero in Mathematics, distillation and perfumery in Chemistry, yoga and ayurveda in Health-care and many more. Aryabhata, the astronomer and mathematician, Dhanvantri, the physician and Nagarjuna, the chemist are among the great scholar-scientists of ancient India. The astronomical observatories at Jaipur and Delhi and the Ashoka Pillar (made up of non-rusting iron alloys) in Delhi are the living testimonies to the high level of science & technology of ancient India.

But, at the time of independence, the country was devoid of science and technology. Since then, the country has traveled a long journey in various development activities. The people of India came together to introduce the country to innovation, advancement, science & technology and the nation was able to defy all hurdles to list the country's name in the high-tech global world. However, still there are certain disturbing trends that are eventually reducing the significance of science in the country.

In the recent past, it has been observed that many students are switching over from science field to other lucrative options. The key factors contributing to this switch over have been found to be low wages and lack of opportunities. To improve this scenario, the country definitely needs renowned scientists and skilled professors. All these factors gave rise to the need to reform the education system, increase the pay package of scientists, liberal funding by the government, and improve infrastructure of science universities, so as to improve the status of science for maintaining the pace with changing times. The Government has also responded swiftly in taking the reforming steps like granting handsome packages for the scientists and teachers, setting up of new Indian Institutes of Science Education and Research, increasing the number of IITs and launching numerous science and technology promotional schemes / programmes.

Likewise, the State DST is also implementing various schemes like scholarships for students pursuing sciences from 9th standard to Undergraduate and Postgraduate level, fellowships for research scholars, science quiz contests, science essay writing competitions, children science congress, celebration of national science day, organization of seminars/workshops, grant for R&D projects, exposure visits for the meritorious students, science workshops / conclaves, Astronomy awareness programmes, Haryana Vigyan Ratna Awards for honoring the scientists of the State for their outstanding work in the field of Science & Technology. All we should hope that results of such nationwide efforts would be available soon.

From the current issue of newsletter we are adding up a new series "A tribute to Indian Scientist" and in this issue we are highlighting Dr. Vikram Sarabhai.

(Vishal Gulia)

TECHNOLOGY DEMONSTRATION

Demo of Desalinization of Brackish Ground Water Technology by CSMCRI

A demo in the Dubhaldhan village, Jhajjar district was carried out through a mobile demo van of CSMCRI during 13th - 14th September 2010. The main objective was to demonstrate the feasibility of the RO technology in purifying the brackish ground water into drinking water. The RO mobile van successfully demonstrated the desalinization process before the villagers in Govt. college premises and nearby field. Curious farmers visited the demo site. Dr. Saket Kumar IAS, ADC/CEO-DRDA also visited the demonstration site along with the Sr. Officers, checked the quality of the RO water and appreciated the efforts carried out by HARSAC/DST, GoH.



Visit by Dr. Saket Kumar, IAS, DC Jhajjar

HARSAC Organized Space Science Congress

Haryana Space Applications Centre, (HARSAC), organized one day "Haryana Space Science Congress" on August 12, 2010 at Modern School, Sector -17, Faridabad on the occasion of birthday of Dr. Vikaram Sarabhai who is known as the father of Indian Space Programme. About 800 students of 40 schools participated in the congress. The objective behind this programme was to sensitize the students about developing a career in science field as good students are not entering to science stream these days. Dr.P.K.Champati Ray, Senior Scientist, from Indian Space Research Organisation (ISRO), Govt. of India, Dehradun delivered an interesting lecture on "Indian Space Programme". He said that India is one of the leading countries in space technology in the world having the capability of fabricating and launching its own satellites with indigenous launching vehicles. He further elaborated that since the launching of first Indian satellite Arya Bhatt in 1975, India had successfully launched 17 Remote Sensing satellites and 24 geostationary satellites. The recently launched Cartosat-2B remote sensing satellite has less than one meter resolution which is capable of identifying the objects smaller than one meter and would be highly useful for urban and infrastructure planning.

Sh. Jaswinder Singh Khoral, Deputy Project Director, Chandrayan Mission, also delivered a talk on "Space Exploration and Chandrayan Mission". Sh. Khoral explained about India's first Chandrayaan-1 Mission which was launched successfully on October 22, 2008 from Sriharikota. The main aim of the Chandrayan-I mission was to develop capability in outer space and to generate data on chemical, mineralogical and photo-geologic mapping of the moon. The spacecraft carried 11 scientific instruments built in India, USA, UK, Germany, Sweden and Bulgaria. The mission put India in the galaxy of six nations which have sent their satellites to moon.

He told that India is planning to launch Chandaryan-II in 2012-13 and manned mission in 2015-16.

These talks were followed by interactive sessions, in which students participated enthusiastically.



AGRICULTURE AND INTELLECTUAL PROPERTY RIGHTS

Intellectual Property is an intangible property created by exercise of intellectual faculty and the rights over this property is governed by statutory rights in accordance with the provisions of corresponding legislations. It rewards creativity which fuels the progress of mankind. It has been divided into seven forms like Patents, Designs, Trademarks, Copyright, Geographical Indications, Integrated Circuit Layout Design and Protection of Plant Varieties and Farmer's Rights. Among these, Protection of Plant Varieties and Farmer's Rights (PPVFR) have been in focus worldwide after the implementation of WTO rules and regulations. Under TRIPS agreement it is obligatory for the member nations to grant patents or *sui generis* system for protection of plant varieties. India has adopted *sui generis* system and brought "Protection of Plant Varieties and Farmer's Right Act 2001 and Rules 2003.

In agriculture, patents may be obtained for processes related agrochemicals, growth promoters and regulators, vaccines, drugs dairy technology, food technology, fuel and biogas production, bioreactors, standardization of various laboratory protocols, environment management etc.

Copyrights, on the other hand, may be registered for databases, bioinformatics, genes and gene sequences, amino acid sequences, antibodies, etc.

Application of industrial designs and topographies of integrated circuits would be relevant, particularly in agricultural engineering.

Nevertheless, in the days to come, IPR is likely to dominate the agricultural scenario. In India, the Patents Act, 1970 hardly included innovations in agriculture under the patentable subject matter. It excluded methods of agriculture and horticulture as well as all innovations in the areas of treatment of animals. This broad exclusion had historical impact and implications in respect of IPR protection in agriculture in the country.

Main aim of PPV&FR Act :

To encourage the scientists, farmers, communities for the development of new varieties having quality and production potential

Registration of varieties for legal protection.

Characterization and documentation of registered varieties

Ensuring the availability of quality seeds of registered varieties

Establishing Gene Fund for rewards and compensation.

Plant varieties can be protected under this Act:

1. New Varieties : There are mainly four criteria to decide whether a plant variety is new or not
- i. Novelty : The variety has not been sold one year prior to the date of application in the country, four years in other countries, however, for vines it has not been sold for six years in other countries.
- ii. Distinctness: The new variety should be distinguishable by at least one essential character.
- iii. Uniformity: Sufficiently uniform in its essential characteristics.
- iv. Stability: Essential characteristics remain unchanged after repeated propagation.

2. Extent varieties:

- i. Varieties notified under section 5 of the Seeds Act, 1966 (54 of 1966) ii. A farmers' variety : which have been traditionally cultivated and evolved by the farmers in their fields; or is a wild relative of a variety about which the farmers possess the common knowledge.

3. Essentially derived varieties:

Derived from another variety (protected or otherwise) and conform to the initial variety in all aspects except for the differences which result from the act of derivation, and yet is clearly distinguishable from such initial variety e.g. Transgenics, mutants, back cross derivatives.

Plant varieties can not be protected under this Act

- i. A plant variety which is liable to mislead or to cause confusion in the characteristics, value
- ii. likely to hurt the religious sentiments of any class or section of the citizens of India
- iii. transgenic variety not cleared by GEAC,
- iv. varieties having terminator gene technology

Crops covered : Presently 18 crops have been covered in PPVFR as listed below.

Wheat, Rice, Cotton, Jute, Sorghum, Pearl Millet, Maize, Sugarcane, Turmeric, Ginger, Black Gram, Green Gram, Chickpea, Kidney bean, Lentil, Pigeonpea, Field Pea.

Duration : Trees and vines for eighteen years from the date of registration of the variety whereas in other cases fifteen years from the date of registration of the variety.

Initially the certificate of registration shall be valid for nine years in the case of trees and vines and six years in the case of other crops and may be revived and renewed for the remaining period on payment of fees as may be fixed by the rules.

Farmer's Rights :

The farmers' rights as defined in the Act are:

- (i) a farmer who has bred or developed a new variety shall be entitled for registration and other protection like a breeder;
- (ii) if the variety fail to perform in the manner claimed by the breeder, the farmer can claim compensation from the breeder.
- (iii) a farmer who is engaged in the conservation of genetic resources of land races and wild relatives of economic plants shall be entitled for recognition and reward, provided that material has been used as donors of genes.
- (iv) a farmer shall be deemed to be entitled to save, use, sow, resow, exchange, share or sell his farm produce including seed of a variety protected under this Act in the same manner as he was entitled before the coming into force of this Act.

Plant Breeder's Right

Breeder's rights extend to seeds and /or propagating material of the protected variety to Production, Selling, Marketing, Distribution, Export and Import.

Researcher's Rights

A researcher has the right for free and complete access to protected material for research use in developing new varieties of plants.

Compulsory license

In case of any complaint against the owner of the registered variety, the Govt. can issue compulsory license to any other person who is interested to produce, distribute and sale the seed of said variety.

Cost of registering a plant variety

DUS Tests Fee

Dependent on the nature and type of test subject to a maximum of Rs. 35,000/- per entry

Fees for registration of EDV

Individual	-	Rs. 5,000/-
Educational	-	Rs. 7,000/-
Commercial	-	Rs. 10,000/-

Renewal fee per year

Individual	-	Rs. 5,000/-
Educational	-	Rs. 7,000/-
Commercial	-	Rs. 10,000/-
Application for benefit sharing	-	Rs. 5,000/-

Registration office :

Registrar, PPV&FR Authority, NASC, Complex, DPS Marg, Opp. Todapur village,

New Delhi-110 012

E-mail : registrar@plantaauthority.in

Website: www.plantaauthority.in

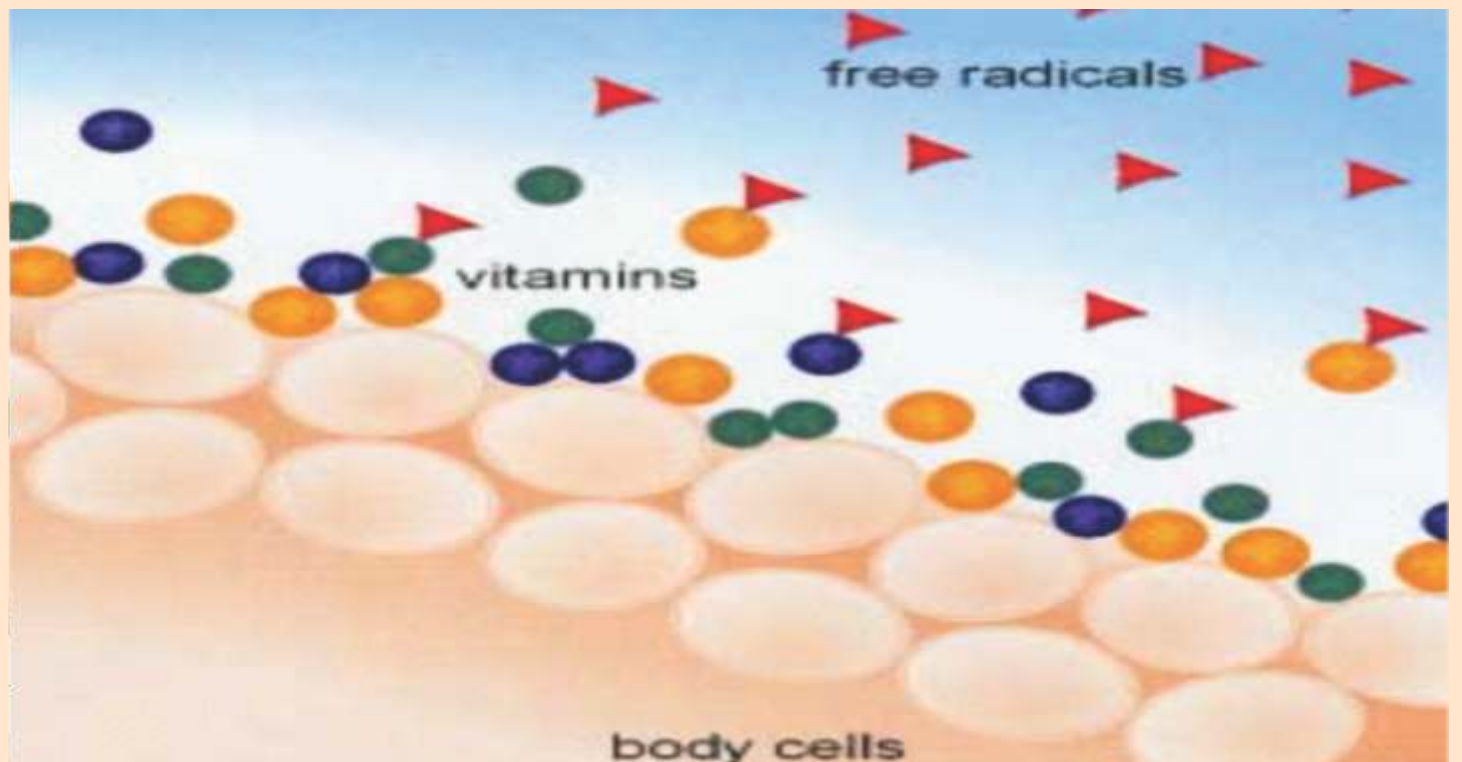
Satish Mehta, Renu and A.K. Dhawan

CPB, CCSHAU New Campus, Hisar

CAN WE SLOW DOWN THE CLOCK OF AGEING?

Antioxidants are a class of vitamins and nutritional ingredients that help, fight and rid the body of free radicals that can cause untold damage to our body. Nowadays the importance of antioxidants is accepted by even the most conservative medical fields, and people find great benefit from these nutritional ingredients in achieving optimum health. Shortage of antioxidants could cause Alzheimer's disease, cancer, cardiovascular disease, cataracts, diabetes, hypertension, infertility, macular degeneration (eye lens degeneration), measles, mental illness, periodontal disease, respiratory tract infection, as well as rheumatoid arthritis. Enough antioxidants to the diet, lessen oxidative stress, and also slowed down the ageing.

Extra antioxidants are required in case of infections, easy bruising, slow wound healing and excessive wrinkling of the skin. Food sources of antioxidants are Berries, grapes, tomatoes, broccoli, red/orange/yellow vegetable and fruits, nuts, peas, broad beans, carrots, watermelon, etc. When the cells and body carry on their daily functions, oxygen is used in the process and oxidation takes place. Although these are normal functions, they do cause free radicals (the waste material of these processes), which can have an influence on the forming of cancer, arterial damage(clogging), inflammation, and premature ageing through oxidative damage. They are also caused by a diet high in fried and barbequed foods, pollution, radiation, etc. All free radicals



produced by the body are not harmful and indeed, free radicals produced by the immune system help to destroy viruses and bacteria. Others are involved in producing vital hormones and activating enzymes that are needed for life itself. To fight these free radicals, antioxidants can be taken into the diet. Anti-oxidants neutralize and destroy the free radicals, helping to detoxify and protect the body. The main sources of antioxidants are vitamin C, vitamin E, vitamin A, plus its precursor beta carotene, as well as Bioflavonoids (vitamin P). Other powerful antioxidant sources are Selenium, Co-enzyme Q10, Grape seed extract and Green tea.

Vitamin C will be more effective if taken with bioflavonoids, calcium and magnesium. To enhance the antioxidant properties, it would be best to take it with the other antioxidants, as there is strong evidence of synergy between all of them. The need for vitamin C will dramatically increase at times when the body is subjected to trauma, infections, and strenuous exercise, elevated environmental temperatures, or if the person is a smoker.

Vitamin E is a powerful antioxidant, protects our cells from oxidation, and neutralizes unstable free radicals, which can cause damage. This is done by the vitamin E giving up one of its electrons to the electron deficient free radical, making it more stable. While performing its antioxidant functions, vitamin E also protects the other antioxidants from being oxidized. This antioxidant also help to prevent degenerative diseases like heart disease, strokes, arthritis, senility, diabetes and cancer.

Vitamin A is required for night vision, and for a healthy skin. It assists the immune system, and because of its antioxidant properties is great to protect against pollution, cancer formation and other diseases. It also assists your sense of taste, helps the digestive and urinary tracts and many believe that it helps slow aging. More of this vitamin is required when you consume alcohol, are on a low-fat diet, or a diet high in polyunsaturated fatty acids, if you smoke, or live in a polluted area.

Vitamin P (Bioflavonoids) refers to many different ingredients and includes hesperin, hesperidin, eriodictyol, quercetin, quercetin, rutin etc. This nutrient cannot be manufactured by the body and must be supplied in the diet. Bioflavonoids are effectively used in the treatment of

sport injuries, in relieving pain in the legs, across the back and can lessen the symptoms of prolonged bleeding, a low serum calcium as well as oral herpes. They may be indicated in the production of bile, lowering blood cholesterol levels and in the prevention and treatment of cataracts.

Selenium has anti-aging properties and has ability to help rid the body of free radicals, as well as toxic minerals such as mercury, lead and cadmium. It is helpful in fighting infections since it stimulates increased antibody response to infections, promotes more energy in the body, helps in alleviating menopausal symptoms in women and assists the male in producing healthy sperm. Men need more selenium than women, as it is lost in the seminal fluid.

Co-enzyme Q10 is a powerful and naturally occurring antioxidant which promotes chemical reactions, protecting the body from free radicals, and is also called ubiquinone. It assists with cardiovascular functioning, the production of energy and the absorption of other nutrients. It also has immune boosting properties. People suffering from angina, HIV, male infertility, diabetes, periodontal disease, high blood pressure, cancer and receiving chemotherapy could benefit from an increase in CoQ10.

Grape seed extract is a natural antioxidant, extracted from the seeds of grapes, helps to protect cells from the damage caused by oxidation, free radicals and also promotes healthy circulation. It is beneficial in treating degenerative and deteriorating diseases because of the potent antioxidant qualities it has. It helps to increase the effectiveness of vitamin C by acting as a carrier and as a restorer of oxidized vitamin C by working with glutathione. It stabilizes collagen and elastin proteins in connective tissues, as well as blood vessels and muscles.

Green tea is used for its antioxidant properties, help to fight mental and physical fatigue, its general health enhancing properties and in the fight against cancer. Green tea helps to prevent blood clotting tendencies, lowers blood cholesterol levels and regulates blood sugar levels. It is also used in weight loss programs. It contains various compounds such as catechin, epigallocatechin, flavonoids, bioflavonoids, fluoride, gallic acid, polyphenols, tannin, theophylline, vitamin C, as well as a small amount of caffeine.

Champa Rani and Sunaina Chawla
CPB, CCSHAU Hisar

DST Haryana establishes a Centre of Excellence in “DNA Fingerprinting and Diagnostics” at CPB, Hisar

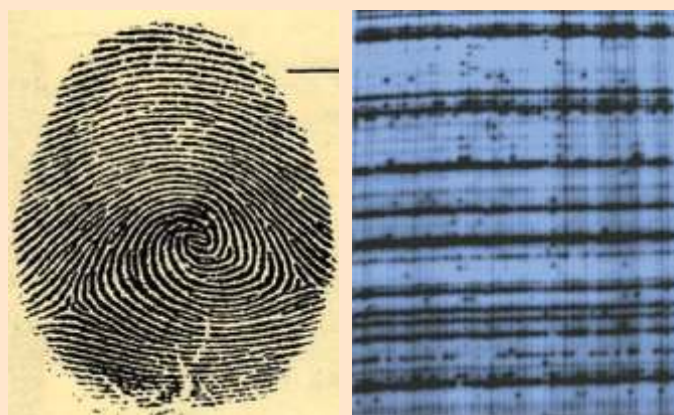
The Centre for Plant Biotechnology, Hisar, which is a part of the Haryana State Council for Science and Technology, Department of Science and Technology, Haryana, has acquired a high degree of scientific competence and developed excellent facilities since its establishment in April 2000. Apart from funding from State Government, it has received financial support worth over Rs. 5.0 crores from DBT, DST and other Government of India agencies under various research grants. CPB has a special niche and has emphasis on applications of Biotechnology to region specific crops and problems. Accordingly, the Centre focuses its activities to deal with regional problems and also imparts training to enhance the employability of State's youth.

To further develop its Hisar Centre, the Haryana State Council for Science and Technology is setting up a new Facility on “DNA Fingerprinting and Diagnostics for research and application in Haryana” at a cost of Rs. 233.85 lakhs at CPB, Hisar. This Facility is one of the two Centres established under a new initiative called “Centre of Excellence (COE)” started by Department of Science and Technology in 2010.

The DNA fingerprinting technique has been used actively for crime investigation and paternity disputes since the past about two decades. Apart from the Centre for DNA Fingerprinting and Diagnostics at Hyderabad, some states have this facility in their Forensic Laboratories. In this technique, extremely small quantities of DNA can be amplified to increase its quantity and then the patterns of DNA are profiled using specific primer systems followed by separation on the gels and their documentation. Interestingly, DNA can be obtained even from millions of

years old samples and from fossilized organisms. Just as the pattern of ridges and grooves of the thumb and fingers can identify a person, the DNA patterns can identify an individual with the chances of two persons having same pattern being as low as 1 in 3 billions.

The technique of DNA Fingerprinting has potential applications in agriculture and plant research. The facility at CPB, Hisar will address the problems of spurious and mixed



seeds, plant variety identification, transgene testing, hybrid origin of seeds, etc and will play a vital role in adding to the financial benefits which a farmer will get after selling his crop. Marker profiles will be developed for the released varieties of major crops of the state. These will be used for DNA fingerprinting and analysis of material required to be tested for authenticity. It will also play an important role in IPR and plant breeder's right protection. Testing facilities of the Centre will be useful for farmers, user departments and industries in ascertaining quality of the planting material. Listed below are some of the important activities that this Centre will undertake:

1. Variety Identification
2. Testing purity and identity of seed material
3. Testing uniformity of tissue culture raised planting material and clonal fidelity of planting materials
4. Authenticity of hybrid origin of the seed being supplied to the farmers
5. Testing transgenic planting material like Bt cotton.



6. Fingerprinting of herbal drugs for authenticating claims of medicinal plant use.
7. Resolving disputes relating to authenticity of varieties, planting material and consumer products.
8. Identification of uncommon diseases affecting crops, using DNA based tools and authentication of virus free seed material
9. For creating DNA marker databases of different crop plants of the state.
10. To provide Fingerprinting services to law enforcing agencies of seed purity testing, strain identification, etc.
11. Trainings potential users and beneficiaries and developing human resource skilled to cater to the needs of State;

12. To provide advisory services to State in establishing DNA fingerprinting facility

Additional Director (Agriculture) pointed out that there was a lot of work for testing hybrid, spurious and mixed seeds especially for GM crops such as Bt cotton. The Department has over 3000 samples every year and advanced testing has to be got done from outside Haryana. This Centre at Hisar will therefore, be a very important facility for the State.

This Centre intends to seek accreditation from NABL (National Accreditation Board for Testing and Calibration of Laboratories, Department of Science and Technology), New Delhi. The issue of State Govt recognition to CoE as a nodal agency for DNA Fingerprinting work is also under consideration.

A.K. Dhawan, Manisha Mangal, Rohtas Singh

A TRIBUTE TO INDIAN SCIENTIST

Vikram Sarabhai was born on 12 August 1919 at Ahmedabad. He has his early education in a private school, 'Retreat', run by his parents on Montessori line. This atmosphere injected into the young boy the seeds of scientific curiosity, ingenuity and creativity. With a natural inclination towards physics and mathematics, Vikram Sarabhai did not get into his family business. After school and college in Gujrat, he went to England and obtained his Tripos at St. John's College in 1939. He returned to India for a while and worked alongside Sir C.V. Raman in the field of cosmic rays, at the Indian Institute of Science in Bangalore. He returned to Cambridge, England for further research in the area and completed his Ph.D. in 1947.

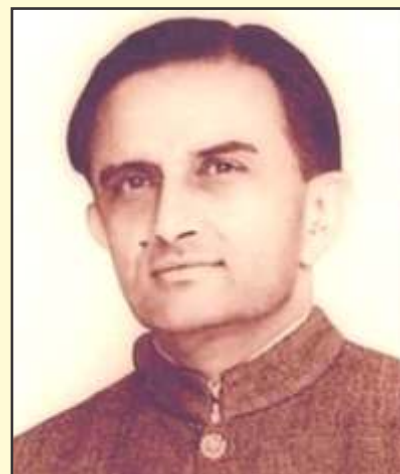
He established the Physical Research Laboratory in Ahmedabad in 1948, in a few rooms at the M.G. Science Institute with Professor K.K. Ramanathan as Director. In April 1954, PRL moved into a new building and Sarabhai made it the cradle of the Indian Space Programme. At the young age of 28, he was asked to organize and create the ATIRA, the Ahmedabad Textile Industry's Research Association and was its Honorary Director during 1949 – 1956. He also helped build and direct the Indian Institute of Management, Ahmedabad from 1962 -1965.

Sarabhai pioneered the space age in India by expanding the Indian Space Research Organization. India's first satellite Aryabhata launched in 1975, was one of the many projects planned by him. Like Bhabha, Sarabhai, wanted the practical application of science to reach the common man. He saw a golden opportunity to harness space science to the

development of the country in the fields of communication, meteorology, remote sensing and education. The Satellite Instructional Television Experiment (SITE) launched in 1975 – 76, brought education to five million people in 2400 Indian villages. In 1965, he established the Community Science Centre in Ahmedabad with a view to popularize science among children.

His deep cultural interests led him, along with his wife Mrinalini Sarabhai, to establish Darpana Academy, an institution voted to performing arts and propagation of the ancient culture of India.

He was the recipient of the Bhatnagar Memorial Award for Physics in 1962, the Padma Bhushan in 1966. He was posthumously awarded the Padma Vibhushan. He was the Chairman of the Atomic Energy Commission in 1966, Vice President and Chairman of the UN Conference on peaceful uses of outer space in 1968, and President of the 14th General Conference of the International Atomic Energy Agency. The International Astronomical Union named a crater in the moon (in the Sea of Serenity) after him, in honour of his contributions science.



Vikram Sarabhai
(1919 – 1971)

DRY LEAVES MANURE MAKER

An innovation by Dr. Rajnesh K. Sharma and Dr. Satendra K. Yadav of Department of Zoology, Kurukshetra University, Kurukshetra (Haryana)

BACKGROUND OF THE INVENTION

- To resolve the problem of disposal of dry leaves and plant litter.
- Burning of dry leaves produces toxic gases like-
 - Benzopyrene
 - Carbon dioxide
 - Carbon monoxide
 - Oxides of Nitrogen
- These gases Cause-
 - Asthma
 - Wheezing
 - Breathlessness
 - Burning of Eyes
 - Irritation of throat
 - Allergy
 - Cancer
- Burring of dry leaves require-
 - Large area
 - Large labour for collection, digging, burring and
 - procuring the manure
 - Longer Duration for Manure formation

OBJECTS OF THE INVENTION

- A novel method for obtaining green manure from dry leaves reduces pollution, space and manpower.
- This technique is quickest of all the existing methods of generating green manure.

- The machine is of great help for the farmers, orchid owners, municipal committees and other organizations.
- This machine greatly reduces the volume of leaves, huge number of heaps of leaves can be packed in small gunny bags and can be used as such as manure.
- These processed leaves can be converted into vermicomposte or organic manure.
- This is eco-friendly method wherein no smoke or harmful gases are released during the disposal of the dead leaves and litter, thus helps in reducing the environmental pollution.
- This machine chops the leaves into convenient size and increases the surface area of the leaves for the faster microbial degradation.



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