

Science and Technology Reporter

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



Vol. 3, No. 1
Jan. - March, 2011



P K Das, IAS
Financial Commissioner &
Principal Secretary to Govt. of Haryana,
Science & Technology Department



CHAIRMAN'S REMARKS

The official newsletter of Science and Technology Department 'Science and Technology Reporter' has completed two successful years of publication. This is a milestone in our efforts to reach out to people.

The Department of Science and Technology has commenced its activities in 2011 with a collaboration with Kurukshetra University to organize a two-day Science Conference on 'Role of Basic Sciences: Igniting Young Minds' on 9th-10th Feb. 2011 at Kurukshetra. The objective of the workshop was to inspire young students to take up science as chosen area of education. The forum produced a unique opportunity to students to interact with eminent scientists. The state level Science Quiz contest was earlier held on 31st January in Panchkula.

HARSAC, working under the aegis of the Department, has commenced work on the ambitious 'Modernization of Land Records' Project. This centrally sponsored project is being executed on behalf of the Revenue Department of the State. The project aims to provide digital cadastral maps with layers of information and geo-referencing for the entire state. This data base is expected to be an effective tool in developmental planning in the State.

I am hopeful that the Department will continue to nurture scientific temper, science education and technology-driven innovation in Haryana.

(P. K. Das)



Editorial Board

Patron:

Shri P K Das, IAS

Financial Commissioner & Principal
Secretary, Science & Technology
Department, Haryana and
Chairman/EC, Haryana State
Council for Science & Technology

Sh. Anurag Agarwal, IAS

Director, Science & Technology
Department, Haryana and
Secretary/EC, Haryana State
Council for Science & Technology

Editor:

Vishal Gulia

Scientific Engineer (B)
Deptt. of Science & Technology
Haryana, Panchkula

Members:

Dr RS Hooda,

Chief Scientist,
Haryana Space Application Centre
Hisar

Shri Rajvir Singh

Scientific Engineer (A)
Deptt. of Science & Technology
Haryana, Panchkula

State Level Science Conference Role of Basic Sciences: Igniting Young Minds

The countries having a strong foundation in basic sciences research are leading the world not only in the technology, but in almost all the spheres in life. For developing country like ours, it is even more crucial to lay a greater emphasis on basic sciences as our technological needs may not always be same as that of the developed world. As regards the development of modern science, India has made a number of singular contributions. In those times, the best of minds used to opt science despite of limited opportunities. Professor C.V. Raman, the first ever Asian to win a Nobel Prize in Physics (1930), is the most appropriate example of this. However, over the last two decades, it has been seen that there is a sharp decline in student's interest towards choosing basic sciences. This shift of interest among students has already started showing its adverse effects. Today, we are facing acute shortage of qualified scientists and science teachers.

Fully aware of this crisis, the Government of Haryana has been proactive in devising innovative strategies for attracting young talented students to the fold of basic sciences. In this regard the "Department of Science and Technology", Haryana and "Kurukshetra University Kurukshetra", jointly organized a two days State level Science Conference on the role of basic sciences in the development of science and technology on 9th – 10th February 2011 with following objectives:-

1. To stimulate young minds toward wonders and challenges in basic sciences.
2. To spread awareness among students about career prospects and job opportunities in basic sciences.
3. To provide live opportunities to students to interact with eminent and leading scientists of the country.
4. To expose students to the fascinating world of science and technology by way of live demonstration and exhibition.



Hon'ble Chief Minister, Haryana, Sh. Bhupinder Singh Hooda lighting a lamp to inaugurate the two day science conference at Kurukshetra University

The conference was inaugurated by Honorable Chief Minister of Haryana Shri Bhupinder Singh Hooda at Shirimad Bhagwadgita Sadan Kurukshetra University. Sh. H.S.Chatha, Cooperation and Food & Supplies Minister, Sh. Randeep Singh Surjewala, Science & Technology Minister, Smt. Geeta Bhukkal, Education Minister, Dr. Ram Parkash, MP Rajya Sabha, Sh. Anil Dhantori, MLA, Shahabad and many other dignitaries were also present on the occasion. Honorable Chief Minister and all other dignitaries addressed the participants and requested them to get motivated from the leading scientists gathered at Kurukshetra for the conference. While addressing the participants, Hon'ble Chief Minister made an announcement for the department to organize four such science conclaves to cover whole of Haryana on yearly basis, so that no region of the State is left untouched in motivating the students to make research in sciences as their career.

Sh. S.S.Prasad, IAS, Financial Commissioner & Principal Secretary to Govt. of Haryana, Department of Science & Technology elaborated about the schemes and new initiatives of the department in the promotion of science and technology



Dignitaries at dais



Hon'ble Chief Minister, Haryana, Sh. Bhupinder Singh Hooda addressing the audience in science conference at Kurukshetra University



Hon'ble Science & Technology Minister, Haryana, Sh. Randeep Singh Surjewala addressing the audience in science conference at Kurukshetra University

in the State and requested the students to avail optimum benefit from these schemes. Prof. S.K. Joshi Padma Bhushan & Padma Shri FNASc., FASc., (formerly DG, CSIR & President, INSA) delivered the keynote address. About more than 4000 students mainly from schools from 10th standard onwards attended this event.

In order to meet all the objectives of the conference, the eminent speakers like Dr. Amit Roy, Director IUAC, New Delhi, Prof. A.K. Bakhshi, Department of Chemistry, University of Delhi, Prof. K.L. Chopra, Formerly Director, IIT Kharagpur, Prof. I. B.S. Passi, IISER Mohali, Prof. K.K Dwivedi, DST Govt. of India, New Delhi, Prof. Mayank N. Vahia, TIFR, Mumbai,



Live demonstrations during the conference

Dr. N. K. Sahoo, BARC Mumbai, Dr. R.S. Verma, Former Director CFSL, Chandigarh, Prof. S.S. Hundal PAU, Ludhiana and Dr. V.P. Uniyal, wildlife Institute of India, Dehradun; addressed the participants followed by interactive sessions. Besides above, live scientific demonstrations and a science exhibition in collaboration with Panorama Science Centre Kurukshetra were also arranged during the conference.

The event was highly successful in providing a unique platform for the students of the State to listen, meet and interact with the leading scientists of the nation in different fields of science and technology.

'Ion Beam Facility' puts State's Kurukshetra University at Top'

Kurukshetra University is set to earn a rare distinction as it is going to be the first University in India to house a unique National 'Ion Beam Facility'. A research project worth Rupees 8.67 Crores has been sanctioned by DST, GOI, New Delhi to Dr. Sanjeev Aggarwal of Department of Physics as its Principal Investigator; Prof. Shyam Kumar, Prof. Nafa Singh, Dr. Annu Sharma (all from Department of Physics) and Dr. D. Kanjilal, Dr. Sundeep Chopra (both from IUAC, New Delhi) as its Co-Investigators to set up this facility for R & D at Department of Physics, Kurukshetra University, Kurukshetra.

This National Facility at Kurukshetra University, will be the 'First' of its kind in any University in India. The name of University will appear on the world map as a place where such facilities are available. This will certainly uplift the status of University both at national and international levels.

This facility aims to promote and facilitate world class research in the field of ion beam applications for the Indian academic and industrial communities. The development of new materials continues to be one of the ongoing technological and scientific revolutions of the 21st century. Ion beam induced materials engineering and growth technology is at the forefront of this revolution because modified surfaces of materials

dictate many of their important properties which are usually not found in traditional materials.

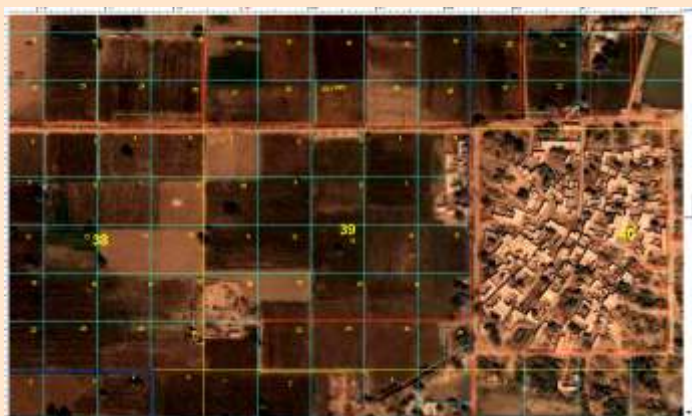
The research atmosphere at the university will get a big boost as this low energy Ion Beam Facility will be used by Physicists as well as other Scientists in wide range of disciplines, including biophysics, lab-on-a-chip technology, nuclear microscopy of degenerative diseases, micro photonics, advanced materials characterisation and semiconductor micro-machining. With the easy accessibility of this facility at Kurukshetra University, in addition to strengthening the existing working groups in this area, many new research groups from the neighboring Universities and Institutes will also be motivated to carryout the frontline research.

Once installed, the 'Ion Beam Facility' (Low Energy Ion Accelerator) will work as a Central facility and users will be allowed to undertake a wide variety of research in various disciplines as indicated above. Moreover, due to its high prospective for technological applications, it will be ideally suited for students training and will provide them with a broad spectrum of basic and applied skills needed in their future career in sciences and industry.

HARSAC takes up Modernization of Land Records for better Land Administration in Haryana

HARSAC has taken a lead in the modernization of land records in the state by digitizing the cadastral maps for better land management in the state. Under the newly launched centrally sponsored scheme called National Land Record Modernization Programme (NLRMP) being funded by Ministry of Rural Development, GOI, entire revenue record of the state will be digitized and updated using the high resolution satellite imageries.

The main objective of the project is to develop a modern, comprehensive and transparent land records management system in the state with the aim to implement the conclusive land-titling system with title guarantee, which will be based on four basic principles. These included a single window to handle land records, including the maintenance and updating of textual records, maps, survey and settlement operations and registration of immovable property. Sirsa and Ambala are the first district in the country, where the entire land maps have been converted into GIS format at the true to scale.



Revenue Department has decided to outsource the work under the project through Haryana Space Applications Centre (HARSAC), Hisar which is the nodal agency in the state for remote sensing and GIS related work. The Project would be implemented by HARSAC through identified vendors in a time specific manner.

All the musavies available at the district headquarters will be digitized in a GIS environment and the same would be updated by the respective village Patwaris using the Sajra maps and other land records available with them. The updated maps would be geo-referenced using the benchmark Ground Control Points being identified and fixed in the entire state using advanced technology of Differential Global Positioning System (DGPS). Finally a seamless database of the land records would be prepared for the entire state. The geo-referenced 0.5 meter resolution World View (WV) satellite data is being acquired for

the entire state which will be overlaid on the digitized cadastral maps used to correct inaccuracies in the data. This overlaying would also create the latest database about the land use, forestry, geomorphology, soil, water prospects and land degradation etc. for each acre of land in the state.

Value addition of the cadastral maps will be done by linking of Records of Rights (RoR) data already computerized by NIC in the state. Besides this other socio-economic data will also be integrated with geo-referenced cadastral maps. This integration of spatial and non-spatial information would greatly aid in village level planning. This will enrich the utility of cadastral maps in the present day context.

Besides the preservation and permanence of records, this information can be used in land value assessment, field level soil health cards, smart cards for farmers to facilitate e-governance and e-banking, settlement of compensation claims, land acquisition and rehabilitation, crop insurance, grant of agricultural subsidies, community/ village resource centers, precision farming etc.

As of now, HALRIS software is being used in Haryana for maintaining the RoR, for registration of Land Deeds. Integration of the database to be created in the current project would streamline the land revenue administration as the system would be temper proof with easy availability of data at the Tehsils/Sub-Division/ District/ State/ CSCs.

Survey work would also be taken up under the project where survey has not been done yet like in Morni Hills. Similarly resurvey and updation of land records will be carried out in areas where lots of changes have occurred, e.g. in Gurgaon and Faridabad areas.

The project also has provision for Digitization and Management of Old Revenue Documents like Misal Hakiat, Field Book and Jamabandi. Besides these scanning of all the deeds registered during last 12 years will also be done. All these documents would be catalogued, indexed, stored in soft format. It is also proposed to establish Modern Record Rooms/ Land Records Management Centers at tehsil/ taluk/ circle/ block levels for better storage and retrieval of land records.

For capacity building under the project, HASRAC would also provide suitable training to all the Tehsildars, Naib-Tehsildars, Kanungos and Patwaris of Revenue Department of Haryana. The officials would be trained to implement the software and the system independently. Revenue Department may also deploy at least two GIS Specialist at each district and one GIS Assistant at each Tehsil to continuously update the geospatial data being created and provide services to the farmers/ citizens/ users related to these revenue records.

Forecasting area and production of Wheat and Mustard using satellite data

HARSAC forecasted district as well as state level area and production of Mustard and Wheat crops for the cropping season 2010-11 under an ongoing project "Forecasting Agriculture Output using Space Agro-meteorology & Land Based Observations (FASAL)". The project is being sponsored by Ministry of Agriculture GOI through Space Applications Centre, Ahmedabad.

Mustard:

Mustard acreage was estimated using IRS P6 LISS-III data of January 12 to 31, 2011. District-level mustard yield was computed using Agro-meteorological models. Meteorological data was used up to January 31, 2011. State level acreage and production show increase by 1.53 and 4.24 per cent in the current year as compared to previous year remote sensing based estimates. Area and production estimates for the 10 major mustard growing districts are indicated in the table.

District	Acreage ('000 ha.)	Production ('000 tons)
Hisar	56.40	96.32
Fatehabad	10.73	19.51
Sirsa	50.46	83.56
Bhiwani	147.76	213.95
Rohtak	12.99	20.06
Jhajjar	34.96	53.67
Gurgaon	15.51	27.14
Mewat	34.94	54.14
Mahendragarh	90.61	133.92
Rewari	66.72	117.16
10 Districts	521.07	819.43
State	543.09	853.70

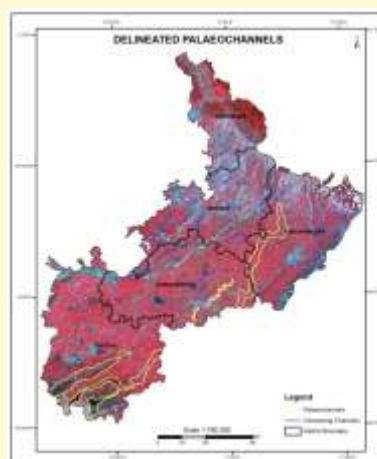
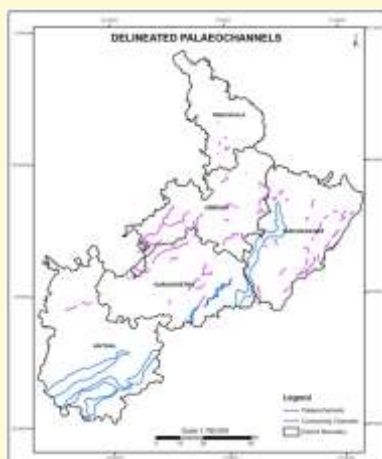
Wheat:

Wheat acreage was estimated using IRS P6 LISS-III data of February 19 to March 25, 2011. District-level Wheat yield computed using Zonal Spectro-Trend yield models. There is an increase of 0.94 percent in acreage and 1.75 per cent in production as compared to last year remote sensing based estimates. Area and production estimates of wheat for all the 21 districts are indicated in the table below:

Sr. No.	District	Acreage ('000 ha.)	Production ('000 tons)
01	AMBALA	84.33	336.60
02	Y/NAGAR	86.71	358.15
03	PANCHKULA	14.78	35.81
04	K.SHETRA	115.15	551.37
05	KARNAL	173.97	814.46
06	PANIPAT	88.69	410.40
07	KAITHAL	179.51	830.50
08	JIND	211.63	978.39
09	SONIPAT	142.26	692.24
10	HISAR	225.48	1011.67
11	SIRSA	272.22	1214.26
12	FATEHABAD	187.07	862.24
13	BHIWANI	150.63	582.56
14	ROHTAK	105.27	436.48
15	REWARI	46.05	199.47
16	FARIDABAD	34.75	154.51
17	M.GARH	45.31	197.28
18	JHAJJAR	92.67	375.75
19	GURGAON	47.97	203.18
20	MEWAT	71.28	283.95
21	PALWAL	87.18	392.73
	STATE	2462.91	10922.00

Delineation of Palaeochannels as Potential Sites for Ground Water Exploration in Piedmont Zone of Haryana

Palaeochannels are the remnants of the pre-existing rivers which were buried or extinct due to tectonic or climatic activities. Northern part of Haryana is situated on piedmont zone which covers mainly Panchkula, Yamunanagar, Ambala Kurukshetra and Kaithal districts have good drainage network which indicates that there may be more number of



drainages in the past in this area. To harness the potential of these old drainages/palaeochannels present study has been done with objectives as to identification and delineation of abandoned river courses/ palaeochannels in piedmont zone on 1:50,000 scale.

Palaeochannels in the piedmont zone have been delineated with the help of Landsat TM satellite

data September 24, 1995 and Radarsat microwave data of November 06, 1998. Ground truth has been done at selected locations. Groundwater samples have also been collected at different locations. The groundwater sample analysis result shows that the source of groundwater at all the locations may be same. Geophysical electrical method (Schlumberger configuration sounding) have been conducted at 14 locations at the delineated palaeochannels in such a way that one sounding in the centre of the palaeochannel and two on the

corner of the palaeochannel falling on the same line. The geophysical investigations indicate fresh groundwater zones at different depths. The delineated palaeochannels are highly useful for recharging groundwater, source of fresh drinking water, irrigation purposes and fresh groundwater reservoir. Flood and water logged water can be diverted into these palaeochannels through canal network which recharge the groundwater that can be used in lean period.

DNA Microarray Technology : A New approach for genome study

Arun Sheoran and Subhash Kajla, Centre for Plant Biotechnology, Hisar

In the today's fascinating world of research microarray is being used at a rapid rate. DNA microarray is a procedure that simultaneously measures multiple samples in a single assay. It consists of an arrayed series of thousands of microscopic spots of DNA oligonucleotides called features. Each feature contains picomoles (10^{-12} moles) of a specific DNA sequence known as probes. As an array can contain tens of thousands of probes, a microarray experiment can accomplish many genetic tests in parallel. Microarray technology evolved from Southern blotting, where fragmented DNA is attached to a substrate and then probed with a known gene or fragment. It is based on hybridization principle. The technique has application in the field of expression studies, genome sequencing, splice variant studies, SNP detection, drug discovery and development and in virus pathogen detection.

Process of microarray involves: microarray fabrication, target preparation, hybridization, slide scanning, image acquisition and data analysis. Microarray fabrication can be done either by photolithography technique or mechanical microspotting or ink jetting method. Microarray is basically of two types: (cDNA) microarray and oligonucleotide microarrays. cDNA probes are usually products of the polymerase chain reaction (PCR) generated from cDNA libraries or genomic DNA, and are typically in excess of 150 nucleotides in length. On the other hand, synthetic oligonucleotides have a maximum length of around 80 nucleotides, thus conferring greater specificity among members of gene families. Once the probe is designed we go for the target preparation which involves fluorescent labeling of target with the cy3 and cy5. Thereafter both probe and the target are given appropriate hybridization conditions in hybridization chamber.

Microarray is a high throughput technique which assays a large set of genes simultaneously in case of microbes, plants and animals. Some of the important applications of microarray in the plant kingdom are as follows:

- Microarray may be directly integrated into plant functional genomic approaches aimed to assign functions to identified genes.
- It is being used for studying the organization and control of genetic pathways acting together to make up the functional organism. The rationale behind this approach is that genes showing similarity in expression pattern may be functionally related and under the same genetic control mechanism.

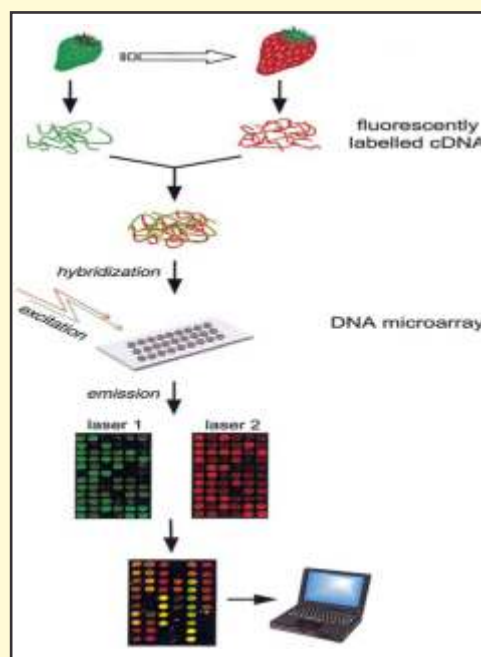
- Microarray has been demonstrated for indentifying novel response genes including those encoding regulatory factors.
- Identification and characterization of genes responding to temperature stress in Chinese cabbage has been done using cDNA microarrays.

Future aspects:

Generating and accumulating thousands of transcription profiles from a vast array of tissues, developmental stages, treatments etc. will make available a fingerprint of a large set of possible transcriptional permutations and combination in the cell.

In the field of DNA variation analysis, microarray based analysis methods enables the determination of alleles at hundreds of thousands of loci, from numerous samples. This will facilitate a closer understanding of the genetic contribution to complex plant traits.

Microarray process can be made high throughput using certain new modification at every step. E-sensor is forward step for the same. Development of new and improved optical, electronic and electrochemical detection systems are expected to improve microarray sensitivity and accuracy.



Shanti Swarup Bhatnagar (1894-1955)

Bhatnagar was born on 21st February 1894 at Bhera, in the district of Shapur in Punjab (now in Pakistan). When he was barely eight months old, his father passed away. He spent the next thirteen years under the care of his maternal grandfather in Bulandshahar in Uttar Pradesh. Under the influence of his grandfather, young Bhatnagar not only developed a taste for engineering and science but also became interested at a very early age in geometry and algebra and in making mechanical toys. In 1911, Shanti published a letter to the editor, in *The Leader*, Allahabad, on how to make a substitute for carbon electrodes in a battery using molasses and carbonaceous matter under pressure and heat.

Matriculating the same year, he joined the Dayal Singh College, Lahore. After finishing his intermediate examination in first division, Shanti joined the Forman Christian College. After his B.Sc. and M.Sc. degrees, he spent the next two year at the University of London earning his D.Sc. degree on the surface tension of oils, under the supervision of Professor F.G. Donnan.

Returning to India in 1921, he joined the Banaras Hindu University as a Professor, remaining there till 1924. From 1924 to 1940 he served as the Director of the University Chemical

Laboratories, Lahore, addressing problems in industrial and applied chemistry.

In August 1940, Bhatnagar took over as the Director of the newly created Directorate of Scientific and Industrial Research. This organization became the Council of Scientific and Industrial Research, with Bhatnagar as its Director. Bhatnagar's tenure saw the setting up of 12 laboratories. The total number of CSIR laboratories today stands at 38.

The British Government conferred on him the Order of the British Empire and in 1941, he was made the Knight Bachelor. In 1943 he was elected a Fellow of the Royal Society, London and received the Padma Vibhushan in 1954 from the Government of India.

Shanti Swarup Bhatnagar played a significant part along with Homi Bhabha, Prasanta Chandra Mahalanobis, Vikram Sarabhai and others in building of post independence, science and technology infrastructure in India and in the formulation of India's science policies.



State Level Science Quiz Contest

Haryana State Council for Science & Technology (Department of Science & Technology, Govt. of Haryana) in its efforts to popularise science in the state has been conducting various science popularisation programmes involving school children such as Children Science Congress, Science Essay Writing Competition, Science Workshops, Haryana Talent Search Examination, Scholarship to the students who pursue their studies in basic Science, Fellowship to Research Students, Science Quiz Contests etc. The aims of organising quiz contests in the state are, to impart science education to the students through fun and entertainment, to

create a deep urge for curiosity, to inculcate the spirit of asking logical questions and their prompt reply. The science quiz contest is organised at three levels i.e. district level, zonal level and state level. There are two categories of the quiz i.e. category 'A' (Schools affiliated with CBSE/ICSE) and category 'B' (schools affiliated with Haryana School Education Board). After organizing the quiz contests at district and zonal levels, the climax i.e. the State Level Science Quiz Contest was organized on 31-01-2011 at Bhawan Vidyalaya, Sector-15, Panchkula. In this contest 32 Zonal Level Winner Teams from different district of the state participated. The State Level Winner Team as under:-

Name of the school		Position	Prize (in Rs)
CATEGORY 'A'		CATEGORY 'B'	
Modern Vidya Niketan, Sector-17, Faridabad	S.M. Hindu Sr. Sec School, Sonapat	.Ist	20,000/- + trophy
Blue Bells Sr. Sec, School, Gurgaon	S.D. Sr. Sec. School, Jagadhari, Yamuna Nagar	IInd	16,000/-
Vaish Sr. Sec. School, Bhiwani	Govt. Model Sr. Sec. School, Bodia Kamalpur, Rewari	IIIrd	12,000/-
Dyal Singh Public School Colony School, Karnal	Sharda Sr. Secd. School, Fatehabad	Consolation	8,000/-

Sh. S.S. Prasad, IAS, Financial Commissioner and Principal Secretary to Govt. Haryana, Science and Technology Deptt, was the Chief Guest of this State level event and he distributed prizes to the winner teams. He explained the activities run by the Deptt. and also encouraged the students to persue studies in basic science in view of the decreasing

popularity for sciences noticed in recent past. Sh. Anurag Agarwal, Director Science and Technology who presided over the function, while conveying the vote of thanks, informed about the new initiatives taken by the deptt. of Science and Technology for uplifting the life of people of the State.



Honour to HARSAC Scientists on Republic Day, 2011



A scientific input based on Remote Sensing data on Soils and Geomorphological conditions of Sirsa, Hisar, Fatehabad, Bhiwani, Mahendergarh, Rewari and parts of Jind and

Rohtak and Drought Prone areas in Bhiwani District was submitted by HARSAC to Superintending Engineer, Command Area Development Circle, Hisar on their request. Based on this report Central CAD&WM (Ministry of Water Resources) Govt. of India sanctioned an additional amount of Rs. 159.39 crore for construction of pucca watercourses in Bhakra & WJC and Siwani Canal Command area during the financial years 2011-12 to 2019-20 i.e. about Rs. 15.90 crore per year.

To recognize the services of HARSAC in providing useful information to various line Departments of the district to aid in their planning process five scientists of HARSAC namely Dr. Ramesh Hooda, Chief Scientist, Dr. V. S. Arya, Sr. Scientist 'SG', Dr. Sulltan Singh Sr. Scientist and Dr. Manoj Yadav, Asstt. Scientist, were honoured by the District Administration, Hisar at the district level Republic Day function on 26 January, 2011.

Training / Seminar / Conference

Dr. Subhash Kajla, Senior Scientific Officer-II from CPB, Hisar has successfully completed the Training Course on "Molecular Methods for Characterization, Conservation and Utilization of Biodiversity" at Centre for Cellular and

Molecular Biology, Hyderabad, India from 26th February to 15th March 2011, organized by Association for the promotion of DNA fingerprinting and other DNA technologies, Hyderabad and Cellular and Molecular Biology, Hyderabad, India.

Haryana State Council for Science & Technology,
Bays 35-38, Sector 2, Panchkula, Haryana
Ph. : 0172-2561339, 2560339, Fax : 0172-2560018
Website : <http://dstharyana.org/>

Kindly send us your feedback to vishalgulia@gmail.com
Available online on www.dstharyana.org

Published by : Vishal Gulia, Scientific Engineer (B), on behalf of Haryana State Council for Science & Technology, Panchkula
Designed & Printed at : Azad Offset Printers (P) Ltd., 144, Press Site, Indl. Area-1, Chd. Ph. : 0172-2652349, 2651316
www.azadoffsetprinters.com