Annual Progress Report

2014-15

COLLEGE OF BASIC SCIENCES
CSK Himachal Pradesh Krishi Vishvavidyalaya
Palampur (H.P.)-176 062

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Foreword

Basic Science is the mother of all inventions. The Basic Sciences are now being given their due importance at ICAR and National level. The faculty of College of Basic Sciences is striving hard to fulfill the mandate through quality education with research and extension support in the University and to generate good human resource to help the rural masses of the State.

The College of Basic Sciences offered 390 credit hours of teaching to the Undergraduates and 200 credit hours to the Postgraduate students of all the constituent colleges of the university during the period of report. Fifty B. Sc., 29 M. Sc. and 07 Ph.D. students completed their degrees during the academic year 2014-2015. Merit scholarships were awarded to 21 students and Amar Shaheed Captain Saurabh Kalia scholarship to 3 students. One educational tour of 2nd year students to South India was successfully conducted. Facilities in the Central Instruments Laboratory were strengthened to impart practical training to the postgraduate students of the constituent colleges and facilitate research. An income of Rs.8,19,169/- was generated by Department of Biology and Environmental Sciences through Vermitechnology revolving fund and Department of Microbiology by imparting paid practical trainings of short durations to the students from other institutions and Department of Physical Sciences and Languages through Statistical Analysis and Audio-Visual Charges.

Teachers of the College were actively involved in various research activities as evident from the projects and number of papers published and presented in National/International Conferences during the year under report. Eleven research projects funded by different agencies were in operation and eight new projects were submitted during the period under report.

Students and staff actively participated in Communal Harmony week celebrations organized in the University Campus from 19 to 25-Nov-2014. A special Camp of NSS was organized at village Rajpur near Palampur from 29-Dec-2014 to 04-Jan-2015. National Science Day was celebrated in the month of February, 2015. The World Environment Day was celebrated on June 7, 2015 in the College. Five days INSPIRE Internship Camps were organised at CSK HPKV, Palampur from 24.7.2012 to 28.7.2012 , 21.8.2012 to 25.8.2012 and 17.10.2012 to 21.10.2012.

Dr.(Mrs.) Neelam Sharma, (Prof. & Head), Department of Chemistry and Biochemistry and Sh. Kapil Sharma, Computer Teacher, Department of Physical Sciences and Languages deserves appreciation for meticulous work of compilation and shaping this report into its final and presentable form.

Palampur

Dean
College of Basic Sciences

ANNUAL REPORT

(For the year 2014-2015)

COLLEGE OF BASIC SCIENCES

CSK HP KRISHI VISHVAVIDYALAYA

PALAMPUR – 176 062

The College of Basic Sciences is one of the four constituent colleges of the Chaudhary Sarwan Kumar Himachal Pradesh Krishi Vishvavidyalaya, Palampur. Initially conceived as the Department of Basic Sciences and Humanities in the then College of Agriculture in 1978, it was elevated to the rank of College of Basic Sciences in May, 1991. It comprises of four departments, namely Biology and Environmental Sciences, Chemistry and Biochemistry, Physical Sciences and Languages and Microbiology, and a Centre for Geoinformatics Research and Training. The College has the following mandate:

Mandate

1. To impart quality education to Under-graduate and Post-graduate students in Basic Sciences leading to B. Sc., M. Sc. and Ph.D. Degrees.
2. To provide support in teaching and basic research to other constituent colleges of the university.
3. To create trained manpower in different disciplines of Basic Sciences.
4. To carry out research work in relation to the state needs for the upliftment of rural masses of the State.

Academics, Students, Staff, Administration & Budget

The faculty of the college was engaged in the following teaching programmes of Under-graduate and Post-graduate studies:
Compulsory courses were offered to the students of (i) B.Sc. (Medical and Non-medical) (ii) B.Sc. (Agri.) (iii) B.Sc. Home Sc. (Hons.) and (iv) B.V.Sc. & A.H. of all the constituent colleges. Postgraduate courses: Major, minor and supporting courses were also offered to the students of M.Sc. and Ph.D. of this college and other constituent colleges. The detail of the total teaching credit hours undertaken by the faculty is given in the Table as below:

Total Credit Hours offered during the Academic Year 2012-13

Name of the Department	Over all		COBS		COA		COHS		COVAS	
	UG	PG	UG	PG	UG	PG	UG	PG	UG	PG
Total	**391**	**200**	**329**	**188**	**21**	**38**	**39**	**23**	**2**	**14**
Biol. & Env. Sciences	113	78	97	78	5	-	9	-	2	-
Chem. & Biochem	79	43	67	43	3	-	9	-	-	-
Microbiology	14	47	-	47	04	12	10	09	-	-
Phys. Sci. & Lang.	182	32	165	20	06	26	11	14	-	14
C.G.R.T.	3	-	-	-	3	-	-	-	-	-

Some of these courses were offered jointly for different colleges wherever it was required.

Students Intake

Total number of students admitted to various undergraduate and postgraduate programmes during the Academic Session 2014-2015 are as below:

Students Intake during 2012-13			
Programme	**Boys**	**Girls**	**Total**
B. Sc.			
M. Sc. (Biochemistry)			
M.Sc. (Biology)			
M. Sc. (Environment)			
M. Sc. (Microbiology)			
Ph.D. (Biochemistry)			
Ph.D. (Microbiology)			

Student Total Strength

In total 224 UG students and 67 PG students registered during the academic year and the break-up is:

Programme	**Boys**	**Girls**	**Total**
B. Sc.			
M. Sc.			
Ph.D.			

At present teachers from other colleges are also associated for teaching in some of the disciplines.

Students Passed Out

The degrees were awarded to 50 UG and 36 PG students as given below

Programme	**Boys**	**Girls**	**Total**
B. Sc.			
M. Sc.			
Ph.D.			

Scholarships Awarded

College Merit Scholarship and ***Amar Shaheed Capt. Saurabh Kalia Scholarship*** were awarded to the following Undergraduate students:

Merit Scholarship			Amar Shaheed Capt.
B. Sc. (I)	**B. Sc. (II)**	**B. Sc. (III)**	**Saurabh Kalia Scholarship**
1.	1.	1.	1.

Budget for Teaching Schemes

The budget expenditure incurred during the year 2012-2013 is given below:

Sr. No.	Scheme No.	Sponsoring Agency	Total Amount (`)
College of Basic Sciences			
1.	APL-011-25 (Agri.)(i,ii,iii)	State Govt.	3,35,84,925/-
2.	APL-009-25 (Agri.)	-do-	40,14,427/-
3.	APL-076-25	-do-	7,183/-
4.	APL-19-25	-do-	9,67,094/-
		Total	**3,85,73,629/-**
Budget 2011-2012 Detail			
	I. Deptt. of Biology and Environmental Sciences		
1.	APL-011-25(iii)	State Govt.	1,24,50,437/-
		Total	1,24,50,437/-
	II. Deptt. of Chemistry & Biochemistry		
1.	APL-011-25(ii)	State Govt.	47,37,862/-
2.	APL-19-25	-do-	9,67,094/-
		Total	**57,04,956/-**
	III. Deptt. of Microbiology		
1.	APL-011-27	State Govt.	23,45,891/-
2.	APL- 009-27	-do-	7,60,020/-
		Total	**31,05,911/-**
	IV. Dean, College of Basic Sciences		
1.	APL-011-25(Agri)(i)	State Govt.	1,40,50,735/-
2.	APL-009-25(Agri.)	-do-	32,54,407/-
3.	APL-076-25	-do-	7,183/-
		Total	**1,73,12,325/-**

REPERSENTATION TO VARIOUS UNIVERSITY BODIES FROM COLLEGE

Academic Council

Dr. Manoj Bhargava Professor & Head, w.e.f. Jan., 2013

Research Council

Extension Council

Educational and Resident Instructions Advisory Committee

Constitution of the Board of Studies of College

Dr.Kamlesh Singh	Dean, College of Basic Sciences	Chairman
Dr. Manoj Bhargava	HOD, Physical Sciences & Languages	Member
Dr. S.S. Kanwar	HOD, Microbiology	Member

		Member
		Member
		Member
		Member
		Member

Sports, Games and Literary Activities

The in-charge for various activities were as:

1.	**Teacher Incharge (Games & Sports)**	**Dr. R.C. Chauhan**
2.	Athletic	Dr. Nageswer Singh
3.	Football	Dr. S. S. Kanwar
4.	Basketball	Dr. R.C. Chauhan
5.	Cricket	Dr. N. K. Gupta
6.	Volley-ball	Sh. Vaibhav Kalia
7.	Kabaddi	Sh. Kapil Sharma
8.	Table-Tennis	Dr. C.K. Oberoi
9.	Badminton	Sh. Kapil Sharma
10.	Chess	Dr. Manoj Bhargava
11.	Cultural Activities	Dr.(Mrs.) Anita Singh & Dr.(Mrs.) Usha Rana
12.	Literary Activities	Dr.(Mrs.) Sharda Singh & Dr.(Mrs.) Suman Sharma
13.	Mountaineering & Hiking	Sh. Kapil Sharma

Educational Tour

An Educational Tour to South India for B.Sc. 2nd Year students of the college was conducted by Dr. Sheela Thakur (Tour In-charge) and Sh. Vaibhav Kalia from 29-12-2013 to 9-01-2014. A total of 59 students (14 boys and 45 girls) alongwith two attendant visited places of educational interest in South India.

Department-wise Faculty position

Sr. No.	Name of the Faculty	Designation
I.	**DEPARTMENT OF BIOLOGY AND ENVIRONMENTAL SCIENCES**	
1.	**Dr. (Mrs.) Anita Singh**	**Professor and Head**
2.	Dr.K.P.Singh	Professor
3.	Dr. Ramesh C. Chauhan	Professor
4.	Dr.Virendra Singh	Principal Scientist
5.	Dr.(Mrs.) Usha Rana	Assistant Professor
II.	**DEPARTMENT OF CHEMISTRY AND BIOCHEMISTRY**	
1.	**Dr. (Mrs.)Neelam Sharma**	**Professor and Head**
2.	Dr. Kamal Mohini	Associate Professor
3.	Dr. Nageswer Singh	Assistant Professor (Ad-hoc)
4.	Dr. Suman Sharma	Assistant Professor (Contract)
III.	**DEPARTMENT OF MICROBIOLOGY**	
1.	**Dr. S.S. Kanwar**	**Professor & Head**
IV.	**DEPARTMENT OF PHYSICAL SCIENCES AND LANGUAGES**	
1.	**Dr. Manoj Bhargava**	**Professor and Head**
2.	Dr. Kamlesh Singh	Professor and Dean

3.	Dr.(Mrs.) Sheela Thakur	Assistant Professor (Ad-hoc)
4.	Sh. Kapil Sharma	Computer Teacher (Contract)
V.	**CENTRE FOR GEOINFORMATICS RESEARCH AND TRAINING**	
1.	**Dr. (Mrs.) Sharda Singh**	**Professor and Programme Director**
2.	Dr. R.S. Rana	Sr. Scientist (Agronomy)
3.	Sh. Vaibhav Kalia	Assistant Professor

Department-wise Staff position in the college

Sr.No	Name	Designation
I.	**DEAN OFFICE**	
A.	**Ministerial Staff**	
1.		
2.		
3.	Sh. M.R.Chaudjary	Sr. Scale Stenographer
4.	Sh. Kalyan Chand	Sr. Assistant
5.		
6.	Sh. Satish Kumar	Jr. Assistant
7.	Sh. Surjeet Kumar	Jr. Assistant
8.	Sh. Randir Singh	Jr. Assistant
B.	**Technical Staff**	
1.	Sh. Jyoti Swaroop	STA-II
2.	Sh Hukum Singh	STA-II
C.	**Class – IV**	
1.	Sh. Hari Singh	Peon
2.	Sh. Ramesh Chand	Peon
3.	Sh. Anup Singh	Beldar
4.	Sh. Sansar Chand	Beldar
5.	Sh. Kehar Singh	Beldar
6.	Smt. Kamlesh Kumari	Sweepress
7.		
II.	**LAND SCAPPING SECTION (COBS)**	
A.	**Class-IV**	
1.	Sh. Sanjayjeet Kumar	Beldar (Transferred on 22-12-2012)
2.	Sh. Keshav Ram	Beldar
3.	Sh. Kuldeep Kumar	Beldar (w.e.f. 21-12-2013)
III.	**BAMBOO SECTION (COBS)**	
A.	**Technical staff**	
1.	Sh. Angat Ram	Field Assistant (Transferred to RSS, Malan)
B.	**Class-IV**	
1.	Sh. Bishamber Dass	Beldar
IV.	**DEPARTMENT OF BIOLOGY AND ENVIRONMENTAL SCIENCES**	
A.	**Ministerial Staff**	
1.	Sh. Yudhvir Singh Rana	Sr. Assistant
B.	**Technical Staff**	
1.	Sh. Arjun Singh	Jr. Technician
2.	Sh. Jagan Nath	Laboratory Assistant
3.	Sh. Baldev Kumar	Laboratory Assistant
C.	**Class-IV Staff**	
1.	Sh. Subhash Chand	Peon

V.	**DEPARTMENT OF CHEMISTRY AND BIOCHEMISTRY**	
A.	**Ministerial Staff**	
1.	Mrs.Nisha Bhardwaj	Sr. Assistant (on half day basis)
B.	**Technical Staff**	
1.	Sh. Dharm Chand	Lab. Assistant
2.	Sh. Shakti Chand	Lab. Assistant
C.	**Class-IV Staff**	
1.	Sh. Santosh Kumar	Lab Helper
2.	Sh. Om Parkash	Peon
VI.	**DEPARTMENT OF MICROBIOLOGY**	
A.	**Ministerial Staff**	
1.	Smt.Usha Rani	Sr. Assistant
2.	Sh. Sushil Kumar	Sr. Scale Stenographer
B.	**Technical Staff**	
1.	Sh.Roshan Lal	Lab. Assistant
2.	Sh. Jai Raj	Lab. Assistant
C.	**Class-IV Staff**	
1.	Sh.Manohar Lal	Peon
VII.	**DEPARTMENT OF PHYSICAL SCIENCES AND LANGUAGES**	
A.	**Ministerial staff**	
1.	Mrs. Nisha Bhardwaj	Sr. Assistant (on half day basis)
B.	**Technical Staff**	
1.	Sh. Surjeet Kumar	Lab. Assistant
C.	**Class-IV staff**	
1.	Sh. Satish Kumar	Beldar (w.e.f. 21-03-2012)
VIII.	**CENTRE FOR GEO-INFORMATICS RESEARCH AND TRAINING**	
A.	**Ministerial staff**	
1.	Sh Randhir Singh	Jr. Assistant (on half day basis)

TEACHING

1. COURSES OFFERED

Following UG and PG courses were offered by the various departments:

I. Department of Biology and Environmental Sciences

Sr. No.	Course No.	Course title	Credit Hours	Name of Instructor
		SEMESTER-I		
	A. Undergraduate Courses			
1.	Bot.111	Phycology and Microbiology	2+1	Dr. Shivani
2.	Bot.112	Bryophytes and Pteridophytes	2+1	Dr. Usha Rana
3.	Bot.211	Gymnosperms	2+1	Dr. Anita Singh
4.	Bot.212	Systematics of Angiosperms	2+1	Dr. Usha Rana
5.	Bot.212(old)	Diversity of seed Plants-Angiosperms	3+1	Dr. Usha Rana
6.	Bot.311	Plant Physiology	2+1	Dr. Usha Rana
7.	Bot.312	Ecology	2+1	Dr. K P Singh
8.	Bot.313	Biotechnology	1+1	Dr. T R Sharma
9.	Zoo.111	Invertebrates-I	2+1	Dr. Meena Kumari
10.	Zoo.112	Cell Biology	1+1	Dr. Meena Kumari
11.	Zoo.211	Chordata-I	3+1	Dr. Meenakshi Sharma
12.	Zoo.212	Biochemistry	2+1	Dr. K Mohini
13.	Zoo.311	Mammalian Physiology-I	2+1	Dr. Madhuri Mehta
14.	Zoo.312	Applied Zoology	2+1	Dr. Madhuri Mehta
15.	Zoo.212(old)	Animal Physiology-1	3+1	Dr. Madhuri Mehta
16.	Zoo.211(old)	Genetics-I	1+1	Dr. Meenakshi Sharma
17.	Env.311(COBS)	Introduction to Environmental Sciences	2+0	Dr.R C Chauhan
18.	Env.311(COHS)	Introduction to Environmental Sciences	2+0	Dr. V Singh
	B. Postgraduate Courses			
1.	Bio.501	Cell Biology	2+0	Dr. Meena Kumari
2.	Bio.502	Developmental Biology	2+1	Dr .Usha Rana/ Dr. MadhuriMehta
3.	Bio.504	Biochemistry	2+1	Dr. Meenakshi Sharma
4.	Bio.511	Radiation Biology	2+0	Dr. Madhuri Mehta
5.	Bio.514	Research Techniques in Biology	2+1	Dr. Anita Singh/ Dr. Usha Rana
6.	PP.502/ Biotech 552	Plant Developmental Biology-Physiological & Molecular Basis	2+0	Dr. Usha Rana
7.	PP.503	Physiological & Molecular responses of plants to Abiotic stresses	2+1	Dr. K P Singh

8.	PP.505	Physiology of growth and yield and Modelling	1+1	Dr. K P Singh
9.	PP-507	Photosynthesis and Respiration	2+1	Dr. K P Singh
10.	Pl.Physiol.591	Masters Seminar	1+0	Dr. Usha Rana
11.	Env.501	Definitionns and Concepts in Environmental Sciences	2+0	Dr. V Singh
12.	Env.503	Environmental Pollution	2+1	Dr.R C Chauhan
13.	Env.504	Environmental Impact Assessment	2+1	Dr.R C Chauhan/ Sh V Kalia
14.	Env.506	Global Climate Change	2+0	Dr. V Singh
		Semester-II		
A.	**Undergraduate Courses**			
1.	Bot. 121	Mycology, Plant Pathology and Lichens	2+1	Dr. Suman Kumar
2.	Bot.122	Cell Biology	2+1	Dr. Usha Rana
3.	Bot.221	Morphology and Anatomy of flowering plants	2+1	Dr. Usha Rana and Dr. Anita Singh
4.	Bot.222	Reproductive Biology	2+1	Dr. Usha Rana
5.	Bot.321	Genetics	2+1	Dr. R. K. Mittal / Dr. S. Lata
6.	Bot.321	Plant Physiology	3+1	Dr. Usha Rana
7.	Bot.322	Utilization of Plants	2+1	Dr. Anita Singh
8.	Bot.322(old)	Utilization of Plants	2+1	Dr. Anita Singh
9.	Zoo.111 (H.Sc.)	Human Physiology & Hygiene	2+1	Dr. Meenakshi Sharma
10.	Zoo. 121	Invertebrates-II	3+1	Dr. Madhuri Mehta
11.	Zoo. 122	Developmental Biology	1+1	Dr. Meena Kumari
12..	Zoo.221	Chordate-II	3+1	Dr. Meenakshi Sharma
13.	Zoo.222	Environmental Biology	2+1	Dr. Meena Kumari
14.	Zoo.321 (new)	Mammalian Physiology	2+1	Dr. Madhuri Mehta
15.	Zoo.321(old)	Applied Zoology-II	2+2	Dr. Meena Kumari
16.	Zoo.322 (new)	Evolution	2+1	Dr. Madhuri Mehta
17.	Zoo.322 (old)	Evolution	2+1	Dr. Meenakshi Sharma
18.	ENV. 311 COVAS	Introduction to Environmental Sciences	2+0	Dr. R.C. Chauhan
19.	ENV. 311 COA	Introduction to Environmental Sciences	1+1	Dr. Virendra Singh
20.	ENV. 311 COHS	Introduction to Environmental Sciences	2+0	Dr. Virendra Singh
21.	Cr. Physiol. 242	Crop Physiology	2+1	Dr. K.P. Singh
B.	**Postgraduate Courses**			
1.	Bio. 506	Plant Physiology	2+1	Dr. K.P. Singh
2.	Bio.507	Taxonomy and Economic Botany	2+1	Dr. Anita Singh
3.	Bio.516	Morphology and Plant anayomy	2+1	Dr. Anita Singh
4.	Bio.533	Plant growth, development and regulators	2+1	Dr. Usha Rana
5.	Bio.536	Physiological Aspects of field	2+0	Dr. K.P. Singh

		Crops		
6.	Bio.537	Abiotic Stress responses in Plants	2+0	Dr. Usha Rana
7.	Bio.591	Master's seminar	1+0	Dr. Anita Singh
8.	Bio.600	Master's Research	1-18	Resp. Advisors
9.	PP. 501	Cellular Physiology and Plant water relations	2+1	Dr. K.P. Singh
10.	PP. 504	Hormonal regulation of Plant growth and Development	2+1	Dr. Usha Rana
11.	PP. 506	Physiology of Crop plants-Specific case studies	2+0	Dr. K.P. Singh
12.	PP. 508	Mineral Nutrition	2+1	Dr. K.P. Singh
13.	PP. 591	Master's Seminar	1+0	Dr. K.P. Singh
14.	ENV. 505	Environmental Chemistry	2+1	Dr. R.C. Chauhan
15.	ENV. 509	Pesticides and Environment	2+1	Dr. R.C. Chauhan
16.	ENV. 510	Environment Conservation	2+0	Dr. Virendra Singh
17.	ENV. 512	Biodiversity/Wildlife Conservation and Himalayan Ecosystem	2+0	Dr. R.C. Chauhan
18.	ENV. 591	Master's Seminar	1+0	Dr. Virendra Singh
19.	ENV. 600	Master's Research	1-18	RespAdvisors

Department of Chemistry and Biochemistry

Sr. No.	Course No.	Course title	Credit Hours	Name of Instructor
		Semester-I		
A.	**Undergraduate Courses**			
1.	Chem-111	States of Matter, Colloids and Chemical Kinetics New	3+0	Ms. Apoorva Panjla
2.	Chem-112	Basic Principles of Inorganic Chemistry, Representative Elements and Noble Gases New	3+1	Dr.Rakesh Kumar
3.	Chem-212	Transition, Inner Transition Elements, Coordination Chemistry and Non Aqueous Solvents New	3+0	Dr.Rakesh Kumar
4.	Chem-213	Chemistry of Functional Groups New	2+1	Ms. Apoorva Panjla
5.	Chem-311	Solutions and Colligative Properties New	2+1	Dr.Suamn Sharma
6.	Chem-313	Natural Products, synthetic polymers and dyes New	3+0	Dr.Rakesh Kumar
7.	Chem-311	Quantum Mechanics & Photochemistry Old	2+0	Dr.Suamn Sharma
8.	Chem-312	Advanced Inorganic Chemistry -I Old	2+1	Dr.Suamn Sharma
9.	Chem-313	Heterocyclics, Pericyclics and Spectroscopy Old	2+0	Dr.Rakesh Kumar
10.	Chem-211	Thermodynamics Old	2+0	Dr.Suamn Sharma
11.	Chem-212	Transition and Inner Transition Elements Old	2+1	Dr.Suamn Sharma
12.	Chem-213	Chemistry of Functional Groups-I(Old)	2+0	Dr.Suamn Sharma
13.	Zoo-212	Biochemistry	2+1	Dr. Kamal Mohini
		Odd Semester Course		
14.	Chem.321	Solution and Spectroscopy	2+1	Dr.Neelam Sharma
14.	Chem.223	Chemistry of Functional Group II	1+1	Dr.Suman Sharma
15.	Chem..221	Electrochemistry and phase equilibrium	2+0	Dr.Suman Sharma
16.	Chem.123	Physical organic chemistry hydrocarbons and organic halides	3+0	Dr.Suman Sharma
		College of Agriculture		
17.	Biochem-351	Biochemistry	2+1	Dr. Kamal Mohini
		College of Home Science		
18.	Biochem-111	Biochemistry	2+1	Dr. Nageswer Singh
19.	FST-111	Biochemistry	2+1	Dr. Nageswer Singh
B.	**Postgraduate Courses**			
1.	Biochem-501	Basic Biochemistry	3+1	Dr. Kamal Mohini
2.	Biochem-503	Human Biochemistry	3+0	Dr.Rajan Katoch

3.	Biochem-511	Carbon & Nitrogen Metabolism	2+1	Dr. Nageswer Singh
4.	Biochem-541	Immunochemistry	2+0	Dr.Rajan Katoch
5.	Biochem-551	Techniques in Biochemistry	1+3	Dr. Nageswer Singh
6.	Biochem-591	Master's Seminar	1+0	Dr. Kamal Mohini
7.	Chem-503	Chemistry of Pesticides	2+1	Dr.Neelam Sharma
8.	Chem -512	Analytical Chemistry	2+1	Dr.Neelam Sharma
9.	Biochem-599	Master's Research	1-18	Respective Advisor
10.	Biochem-699	Doctoral Research	1-18	-do-
		Semester-II		
A.	**Undergraduate Courses**			
1.	Chem-121	Thermodynamics, Electrochemistry & Equilibrium	3+1	Dr. Suman Sharma
2.	Chem-123	Physical Organic Chemistry Hydrocarbons & Organic Halides	3+0	Mr. Vikrant Sharma
3.	Chem-221	Quantum Mechanics and Photochemistry	3+0	Dr. Suman Sharma
4.	Chem-222	Advanced Inorganic Chemistry-I	2+1	Mr. Vikrant Sharma
5.	Chem-322	Advanced Inorganic Chemistry -II	3+0	Mr. Vikrant Sharma
6.	Chem-323	Heterocyclic, Polynuclears, Hydrocarbons and Spectroscopy	2+1	Mr. Vikrant Sharma
7.	Chem-221	Electrochemistry and Phase Equilibrium(Old)	2+0	Dr. Suman Sharma
8.	Chem-223	Chemistry of Functional Group-II (Old)	1+1	Dr. Suman Sharma
9.	Chem-321	Solutions and Spectroscopy (Old)	1+1	Dr. Suman Sharma
10.	Chem-322	Advanced Inorganic Chemistry –II (Old)	2+0	Dr. Suman Sharma
11.	Chem-323	Natural Products, Synthetic Polymers & Dyes(Old)	2+0	Mr. Vikrant Sharma
12.	Chem-324	Analytical Techniques in Chemistry(old)	0+1	Dr. Neelam Sharma
		Odd Semester courses		
13.	Chem-111	States of Matter, Colloids and Chemical Kinetics	3+1	Dr.Suman Sharma
14.	Chem-212	Transition, Inner Transition Elements, Coodination Chemistry and Non-Aqueous Solvents	3+0	Dr. Neelam Sharma
15.	Chem-213	Chemistry of Functional Group-I (Old)	2+0	Dr.Suman Sharma
16.	Chem-311	Quantum Mechanics and Photochemistry (Old)	2+0	Dr.Suman Sharma
17.	Chem-313	Heterocyclics, Pericyclics and Spectroscopy (Old)	2+0	Dr. Suman Sharma
		College of Home Science (Odd Semester Course)		
18.	FST-111	Biochemistry	2+1	Dr. Nageswer Singh

B.	**Postgraduate Courses**			
1.	Chem-512	Analytical Chemistry	2+1	Dr. Neelam Sharma
2.	Biochem-502	Plant Biochemistry	3+0	Dr. Kamal Mohini
3.	Biochem-504	Enzymology	2+1	Dr. Nageswer Singh
4.	Biochem-505	Intermediary Metabolism	3+0	Dr. Kamal Mohini
5.	Biochem-521	Food and Nutritional Biochemistry	2+1	Dr. Nageswer Singh
6.	Biochem-591	Master's Seminar	1+0	Dr. Nageswer Singh
7.	Biochem-601	Biochemistry of Biotic and Abiotic stresses	3+0	Dr. Kamal Mohini
8.	Biochem.602	Advanced Molecular Biology	3+0	Dr. Rajan Katoch
9.	Biochem-611	Advanced Techniques in Biochemistry	0+2	Dr. Nageswer Singh
10.	Biochem.691	Doctoral Seminar	1+0	Dr. Nageswer Singh
11.	Biochem-599	Master's Research	1-18	Respective Advisor
12.	Biochem-699	Doctoral Research	1-18	-do-
		Odd Semester Course		
13.	Biochem-501	Basic Biochemistry	3+1	Dr. Kamal Mohini

II. Department of Microbiology

Sr. No.	Course No.	Course title	Credit Hours	Name of Instructor
		Semester-I		
A.	**Undergraduate Courses**			
1.	Micro-121	Basic Microbiology	1+1	Dr. S.S.Kanwar
2.	BOT-111	Phycology & Microbiology	2+1	Dr.(Ms.) Shivani
3.	FST-118	Fundamentals of Microbiology	2+1	Dr.(Ms.) Shivani
4.	FST-232	Fermentation and Industrial Microbiology	2+1	Dr.(Ms.) Shivani
5.	FST-352	Food Biotechnology	2+1	Dr. C.R.Sharma
6.	FST-355	Food Safety and Microbial Standards	2+1	Dr. M.K. Gupta
B.	**Postgraduate Courses**			
1.	Micro-501	Principles of Microbiology	2+1	Dr. S.S.Kanwar
2.	Micro-512	Microbial Management of Organic Wastes	2+1	Sh. Rajinder Kumar
3.	Micro-531	Food Microbiology	2+1	Dr. C.R. Sharma
4.	Micro-551	Introduction to Human Microbial Pathogens	2+1	Dr. M.K. Gupta
5.	Micro-591	M.Sc. Seminar	1+0	Dr.S.S. Kanwar
6.	Micro-599/600	M.Sc. Research		Respective Advisor
7.	Micro-699/700	Doctoral Research		Dr.S.S.Kanwar
		Semester-II		
A.	**Undergraduate Courses**			
1.	Micro-121	Basic Microbiology	1+1	Dr.(Ms.) Shivani

2.	Ag. Micro-121	Agricultural Microbiology	2+1	Dr. M.K. Gupta
3.	FST-123	Food Microbiology	2+1	Dr.(Ms.) Shivani
B.	**Postgraduate Courses**			
1.	Micro-541	Industrial Microbiology	2+1	Dr. C.R. Sharma
2.	Micro-599/600	M.Sc. Research		Respective Advisor
3.	Micro-691	Seminar	1+0	Dr. S.S. Kanwar
4.	Micro-699/700	Doctoral Research		Dr. S.S. Kanwar

III. Department of Physical Sciences and Languages

Sr. No.	Course No.	Course title	Credit Hours	Name of Instructor
		Semester-I		
A.	**Undergraduate Courses**			
1.	Phys 111	Mechanics & Theory of Relativity	4+0	Mrs Alpana Thakur
2.	Phys 112	Current Electricity and Magnetism-I	2+1	Dr (Mrs) Sheela Thakur
3.	Math 111	Algebra and Trigonometry	3+0	Sh V P Sood
4.	Math 112	Calculus	3+0	Dr (Mrs) Sharda Singh
5.	Comp 111	Principles of Computers-I	1+1	Sh Vaibhav Kalia
6.	Eng 111	Communicative and Functional English	2+0	Sh Rajesh Kumar
7.	Phys 112	Vector Calculus and Electrostatics	2+0	Dr (Mrs) Sheela Thakur
8.	Math 112	Calculus	3+0	Dr (Mrs) Sharda Singh
9.	Math 112	Calculus	3+0	Dr (Mrs) Sharda Singh
10.	Math 121	Algebra and Ordinary Differential Equation	3+0	Dr (Mrs) Sharda Singh
11.	Math 122	Geometry	3+0	Dr (Mrs) Sharda Singh
12.	Math 211	Advanced Calculus	4+0	Mrs Anupam
13.	Phys 211	Oscillation and Waves	3+0	Dr (Mrs) Sheela Thakur
14.	Phys 212	Quantum Mechanics	3+0	Dr (Mrs) Sheela Thakur
15.	Math 211	Advanced Calculus	4+0	Sh V D Vasishtha
16.	Phys 311	Nuclear Physics	3+0	Mrs Alpana Thakur
17.	Phys 312	Electronics-I	2+1	Dr (Mrs) Sheela Thakur
18.	Math 311	Analysis	3+0	Dr (Mrs) Sharda Singh
19.	Math 312	Abstract Algebra	3+0	Sh V D Vasishtha
20.	Phys 311	Solid State Physics	3+0	Dr (Mrs) Sheela Thakur
21.	Phys 312	Nuclear Physics-I	3+0	Dr (Mrs) Sheela Thakur
22.	Phys 313	Physics Laboratory-V	0+1	Dr (Mrs) Sheela Thakur
23.	Math 311	Analysis	3+0	Dr (Mrs) Sharda Singh
24.	Math 312	Abstract Algebra	4+0	Sh V D Vasishtha
25.	Stat 351	Statistics	1+1	Dr Manoj Bhargava
26.	Eng 111	Comprehension and Communication Skills in English	1+1	Sh Rajesh Kumar
27.	Comp 111	Computer Science	1+2	Sh Kapil Sharma
28.	Stat 231	Elementary Statistics	1+1	Dr Kamlesh Singh
29.	Comp 115	Application of Computers	2+2	Sh Kapil Sharma

30.	Math 121	Algebra and Ordinary Differential Equation	3+0	Dr (Mrs) Sharda Singh
31.	Math 122	Geometry (New Syllabus)	3+0	Sh V P Sood
32.	Phys 121	Statistical Physics and Thermodynamics (New Syllabus)	3+0	Dr (Mrs) Sheela Thakur
33.	Comp 221	Computer Programming-C (Non-Medical)	2+1	Sh Vaibhav Kalia
34.	Math 222	Statics	2+0	Dr (Mrs) Sharda Singh
35.	Math 321	Metric and Inner Product Spaces	3+0	Sh V D Vasishtha
36.	Math 322	Numerical Analysis	3+1	Dr (Mrs) Sharda Singh/ Sh Vaibhav Kalia
B.	**Postgraduate Courses**			
1.	Stat 491	Introduction to Statistics	1+1	Dr Kamlesh Singh
2.	Stat 511	Statistical Methods for Applied Sciences	3+1	Dr Manoj Bhargava
3.	Stat 513	Sampling Techniques	2+1	Dr Manoj Bhargava
4.	Stat 541	Mathematical Statistics	3+0	Dr Manoj Bhargava
5.	Comp 501	Computer Fundamental and Programming	2+1	Sh Kapil Sharma
		Semester-II		
A.	**Undergraduate Courses**			
1.	Phys 121	Statistical Physics and Thermodynamics	3+0	Mrs Sushila Devi
2.	Phys 122	Current Electricity and Magnetism-II	2+1	Dr (Mrs) Sheela Thakur
3.	Math 121	Ordinary Differential Equations and Vector Analysis	3+0	Dr (Mrs) Sharda Singh
4.	Math 122	Geometry	3+0	Sh V P Sood
5.	Comp 121	Principles of Computers-II	1+1	Sh Vaibhav Kalia
6.	Eng 121	Comprehension, Composition and Translation	2+0	Sh Rajesh Kumar
7.	Phys 221	Quantum Mechanics and Spectroscopy	3+0	Mrs Sushila Devi
8.	Phys 222	Electrodynamics	2+1	Mrs Alpana Thakur
9.	Math 221	Partial Differential Equations	3+0	Sh V D Vasishtha
10.	Math 222	Calculus of variation and Laplace Transform	3+0	Sh V P Sood
11.	Comp 221	Computer Programming in C (Non-Medical)	2+1	Sh Vaibhav Kalia
12.	Comp 222	Applications in FoxPro and Programming in BASIC (Medical)	2+1	Sh Kapil Sharma
13.	Phys 221	Optics and Lasers	3+0	Mrs Alpana Thakur
14.	Phys 222	Atomic, Molecular and X-rays Spectra	2+0	Dr (Mrs) Sheela Thakur
15.	Math 222	Statics	2+0	Dr (Mrs) Sharda Singh
16.	Phys 321	Solid State Physics	3+0	Mrs Alpana Thakur
17.	Phys 322	Electronics-II	2+1	Mrs Sushila Devi
18.	Math 321	Metric and Inner Product Spaces	3+0	Sh V D Vasishtha
19.	Math 322	Numerical Analysis	3+1	Dr (Mrs) Sharda Singh/ Sh Vaibhav Kalia
21.	Stat 321	Introduction to Statistics	2+1	Dr Manoj Bhargava
22.	Phys 321	Nuclear Physics-II	3+0	Dr (Mrs) Sheela Thakur
23.	Phys 322	Electronics	3+0	Dr (Mrs) Sheela Thakur
24.	Phys 323	Physics Laboratory–VI	0+1	Dr (Mrs) Sheela Thakur

25.	Comp 241	Introduction to Computer Application	1+1	Sh Kapil Sharma
26.	Eng 121	English and Technical writing	1+1	Sh Rajesh Kumar
27.	Phys 211	Oscillation and Waves	3+0	Dr Sheela Thakur
28.	Math 211	Advanced Calculus	4+0	Dr Sharda Singh
29.	Stat 351	Statistics	1+1	Dr Manoj Bhargava
B.	**Postgraduate Courses**			
1.	Stat 491	Introduction to Statistics	1+1	Dr Kamlesh Singh
2.	Stat 511	Statistical Methods for Applied Sciences	3+1	Dr Manoj Bhargava
3.	Stat 513	Sampling Techniques	2+1	Dr Manoj Bhargava
4.	Stat 541	Mathematical Statistics	3+0	Dr Manoj Bhargava
5.	Comp 501	Computer Fundamental and Programming	2+1	Sh Kapil Sharma

IV. Centre for Geoinformatics Research and Training

Sr. No.	Course No.	Course title	Credit Hours	Name of Instructor
		Semester-I		
	A. Undergraduate Courses			
1.	GIS-481	Remote Sensing GIS and Land Use planning	1+2	Dr. R.S. Rana / Mr. Vaibhav Kalia
	B. Postgraduate Courses			
1.	GIS-501	Geographic Information System and its Applications	2+1	Dr. R. S. Rana/ Dr. Sharda Singh
2.	GIS-502	Remote Sensing and its applications	2+1	Dr. R.S. Rana / Sh. Vaibhav Kalia

2. THESES COMPLETED

I. Department of Biology and Environmental Sciences

M. Sc. (Biology)

Sr. No.	Name of student & Admission No.	Title of Thesis	Name of Major Advisor
1.	Ms Ashima Thakur, S-2012-30-004	Ethonobotanical Studies on Wild Medicinal Plants used by Local Communities of Distt. Kullu	Dr.(Mrs.) Anita Singh
2.	Ms Sugandhi Kapoor S-2012-30-006	Physiological and Biochemical responses to cold stress in Chickpea (Cicer arietinum L.) Tolerance	Dr.(Mrs.) Usha Rana

M. Sc. (*Environmental Sciences*)

Sr. No.	Name of student & Admission No.	Title of Thesis	Name of Major Advisor
1.	Abhay Kumar S-2012-30-008	Soil fertility Status under seabuckthorn (Hippophae L.) in different altitudes in Spiti	Dr.Virendra Singh

II. Department of Chemistry and Biochemistry

M.Sc. (Biochemistry)

Sr. No.	Name of student & Admission No.	Title of Thesis	Name of Major Advisor
1.	Ms. Anu Bharti S-2012-30-001	Chromatography characterization of polyphenolic compounds of some tannin-rich plants.	Dr.T.K.Bhat
2.	Ms. Esha Sharma S-2012-30-002	Biochemical and persistence studies of clodinafop-propgryl in wheat	Dr.Neelam Sharma

3.	Ms. Shivangi S-2012-30-003	Studies of phenolic compounds and molecular characterization of RNA-DNA viruses in Valeriana spp.	Dr. Nageswer Singh

III. Department of Microbiology

Ph.D. (Microbiology)

Sr. No.	Name of the Student and Admission No.	Title of Theses	Name of Major Advisor
1.	Ms. Keshani (S-2010-40-02)	Diversity analysis of *Saccharomyces cerevisiae* population from North-Western Himalayan region using molecular markers.	Dr. S.S. Kanwar
2.	Ms. Natasha (S-2009-40-02)	Microbiological studies on cow horn manure – a biodynamic preparation used in organic farming.	Dr. M.K. Gupta
3.	Ms. Ritika (S-2010-40-03)	Bacterial diversity of salt tolerant nitrogen fixers around the salt mines of Himachal Pradesh.	Dr. S.S. Kanwar
4.	Ms. Sunita Devi (S2010-40-04)	Microbial diversity of aerobic culturable thermophiles existing in the hot spring of Manikaran, Himachal Pradesh.	Dr. S.S. Kanwar

M. Sc. (Microbiology)

Sr. No.	Name of the Student and Admission No.	Title of Theses	Name of Major Advisor
1.	Ms. Bindu Devi (S-2012-30-011)	Optimization of growth conditions of indigenous probiotics Lactobacillus species and their interaction studies with food borne pathogens.	Dr. S.S. Kanwar
2.	Ms. Anita (S-2012-30-009)	Studies on rhizosphere bacterial diversity associated with *Arnebia euchroma* (Ratanjot).	Dr. S.S. Kanwar
3.	Ms. Bindu Thakur (S-2012-30-010)	Evaluation of probiotic potential of microorganisms in commercial food products.	Dr. S.S. Kanwar

3. SHORT TRAININGS

The Department of Microbiology imparted training to the students of the Lovely Professional University, Phagwara (Pb)

4. MANUAL

1. Manual: Laboratory manual on Techniques in Biochemistry by Dr. Nageswer Singh, Dr.C.K.Oberoi and Ms. Kanika

2. Practical Lab Manual on " Remote sensing , GIS and Land Use Planning" with Hands on exercises (2013) (Vaibhav Kalia, Ranbir Singh Rana, Sharda Singh, Kunal Sood and Arun Kaushal and Nutan Sharma 2013, CGRT COBS , CSKHPKV , Palampur.

5. NATIONAL ELIGIBILITY TEST (NET)

The following students have cleared National Eligibility Test (NET) in the year 2011-12:

1. Ms. Sohini Walia (S-2009-40-04)
2. Ms. Sakshi Sharma (S-2012-40-004)

6. INSPIRE FELLOWSHIP

1. Ms. Natasha (S-2009-40-02)
2. Ms. Sohini Walia (S-2009-40-04)

7. AWARDS/HONOURS

1. Best Poster Presentation award in 2nd Annual Conference of Probiotic Association of India and the International Symposium "Probiotics and Microbiome: Gut and Beyond" held at India Habitat Centre, New Delhi on November 3-4, 2014: **Sharma S. and Kanwar S.S. (2014) Antagonistic potential of indigenous bacterial probiotics of North-Western Himalayas against anaerobic bacterial pathogens.**
2. 2nd Prize in poster presentation in 35th Annual Conference of Indian Association of Biomedical Scientists on "Environment and Health" held at CSK HPKV, Palampur from November 14-16, 2014: **Chauhan A, Kanwar SS (2014). Studies on exopolysaccharide production by indigenous lactic acid bacteria p 73.**
3. 3rd Prize in poster presentation in 35th Annual Conference of Indian Association of Biomedical Scientists on "Environment and Health" held at CSK HPKV, Palampur from November 14-16, 2014: **Rana K, Kanwar SS (2014). Purification and characterization of bacteriocin(s) of *Enterococcus* spp. obtained from fermented foods of Himachal Pradesh p 74.**

RESEARCH

I. ON-GOING RESEARCH PROJECTS

Sr. No.	P.I./Co-P.I.	Title of the Project	Budget outlay (in lakhs)	Funding Agency	Duration of the Project
1.	Dr. Virendra Singh	Introduction and Evaluation of Improved Russian Seabuckthorn Varieties in Lahaul-Spiti, Cold deserts of Himachal Pradesh	38.40	DST	2014-2017
2.	Dr. Virendra Singh	Characterization and Consolidation of Hippophae Genetic Resources and Propagation of Elite Genotypes for Varietal Evaluation	34.90	DST	2014-2017
3.	Dr. Nageswer Singh	Evaluation of nutritionally important biochemical constituents of promising buckwheat, chenopod and Adzuki bean.	0.8 **(Annually)**	AICRP, Net work on Underutilized Crops, ,NPBGR, Pusa Campus ,New Delhi	2008 to till date (continuing)
4.	Dr S.S.Kanwar	Distribution of liquid biofertilizer in Kangra district for cash crops under protected cultivation and development of recommendations based on field experience	25.00	RKVY	Nov. 2014 to Sept, 2015
5.	Dr S.S.Kanwar (Collaborative project with NDRI, Karnal)	Bio prospecting of lactic cultures from cold desert regions to develop functional fermented milk products with potential health benefits	51.89 17.87 (Univ. Share)	DST	June 2015 3 years
6.	Dr S.S.Kanwar	Development of Potential direct fed microbial from rumen of migratory goats & sheep for enhancing livestock production (*Project in collaboration with IVRI, Palampur*)	43.50	DST	January, 2013 for 3 years
7.					
8.	Dr. Sharda Singh Dr. Ranbir Rana, Mr. Vaibhav Kalia	Spatial disaggregation of agricultural statistical data & food security analysis through SPOT VEGETATION datasets for a mountainous state of Himachal Pradesh	8.75	UGC, New Delhi	-
9.	Sanjay Kumar Sharma	Status of primary, secondary and micronutrients of soils under	12.0	RKVY, DOA, HP.	-

	Dr. Ranbir S. Rana Dr. N.K.Shakhayan and Dr. Luxmi Kant Sharma	vegetables – horticultural land use system in high hills dry temperate			

II. RESEARCH PROJECTS COMPLETED

Sr. No.	P.I./Co-P.I.	Title of the Project	Budget outlay (in lakhs)	Funding Agency
1.				
2.				
3.				
4.	Sharda Singh, Ranbir Rana, V. Kalia	GIS based Agriculture Resource Information System for Himachal Pradesh 2010-13	11.45	RKVY

III. RESEARCH PROJECTS SUBMITTED

Sr.No.	Title of the project	Budget outlay	Funding Agency
1.	Establishment and Development of Agro-techniques for Medicinal Plant Bio-Resources under Sub temperate and Sub humid Agro-climatic Conditions vis-à-vis Enhancing Instructional Capability (Dr Anita Singh)	315 lac	Dr Anita Singh ICAR. New Delhi
2.	Modeling the Agro techniques for Quality and quantity improvement of selected species of herbals in Sub-humid and Sub temperate climate (Dr Anita Singh)	45 lac	SNMP Board
3.	Mass propagation, plantation and semi-processing of seabuckthorn in Lahaul (Dr Virender Singh)	121.49 lakhs	Department of Agriculture, Govt. of HP
4.	Application of microbial bioinoculant(s) for extraction of flax fibre. **Consortia Research Platform - Natural Fibres Project**	-	Dr.Neelam Sharma HP State Council for Science on 29.11.14
5.	Spatial Data Infrastructure for Rural Development for the State of Himachal Pradesh (Dr.S.S.Kanwar)	22.0 Lakh	Department of Rural Development, Govt of Himachal Pradesh, Shimla

IV. Research Highlights

Highlight-I

Seeds of 11 exotic improved seabuckthorn varieties (NX 1-11) were imported through NBPGR and sown at university farm at Kukumseri in Lahaul (Fig. 1).

Highlight-II

At the end of growth season (October 2014), observations for the height and leaf size and occurrence of diseases and pests were recorded for 10 plants with 3 replicates. Variation in the height of seedlings of various seabuckthorn exotics was observed. Exotic NX-3 showed the maximum height of 7.8 cm, followed by NX-5 and NX-8 (Fig. 2, 3). and others, whereas, it was almost similar in case of NX-8, NX-4, NX- 6 & NX-7 and a minimum in case of NX-11 (4.1 cm) NX-3, 5 and 8 showed better growth (height) of seedlings, NX-4, 5 & 3 showed better leaf length, whereas, NX-5, 3, & 4 showed better leaf width. It can be seen that in the early stage of growth, NX-3, 4, 5, & 8 are more promising in growth than other, NX-11 being the most poor in growth

Fig. 1. Gorwth of exotic seabuckthorn varieties after one year of growth in Oct. 2014. at Kukumseri, Lahaul, HP.

Fig.2 . Seabuckthorn exotics growing poly bags. Fig. 3. Close view of seedlings of seabuckthorn exotics.

Success Story: Ten Russian seabuckthorn nearly thornless improved varieties introduced at University Research Station at Kukumseri in Lahaul-Spiti under DST funded research project on "*Introduction and Evaluation of Improved Russian Seabuckthorn Varieties in Lahaul-Spiti, Cold deserts of Himachal Pradesh*", under the supervision of Prof. Virendra Singh for Rs. 38.4 lakh (2014-2017).

Highlight-III

Herbicide residues and environmental quality

Herbicide residues in long term herbicide trial

- In permanent herbicide trial on transplanted rice-wheat sequence, isoproturon residues in post harvest soil, wheat straw and grain were below detectable level.

- Clodinafop applied treatments in wheat crop in permanent herbicide trial on transplanted rice-wheat sequence recorded below detectable levels of clodinafop residues in soil, wheat straw and grain.

Studies on herbicide persistence in water

- Herbicide butachlor was not present after one month of herbicide spray in collected water samples near agriculture fields of CSKHPKV.

- More than 95% of the applied herbicide 2,4-D degraded from the aquatic system within 20 days. Half life of 2, 4-D was less than 10 days. There was no effect noticed on water pH.

Persistence of herbicides may be tested in the farmer's field (soil and crop produce)

- Soil and wheat grain samples from the isoproturon treated fields of Mandi district farmers at the harvest of the crop recorded below detectable levels of isoproturon residues.

Studies on secondary metabolites of herbicides

- A HPLC method was developed for simultaneous determination of MSM and its major metabolites. *viz*. methyl-2-sulfonyl-amino benzoate (Compound I), 2-amino-6-methoxy-4-methyl triazine (Compound II) and saccharin (Compound III). The retention time value for metsulfuron methyl was 4.063 min whereas Compound I, II and III eluted at retention time 3.226, 3.234 and 3.886 min respectively.

Monitoring of pesticide residues in vegetable crops:

- Out of 145 samples analysed for pesticide residues, more than 26% samples were contaminated with different pesticides. Maximum samples *i.e.*11% showed presence of organochlorines followed by 10 % herbicides, 5% for organophosphates and 3.4% synthetic pyrethroids. Total 145 vegetable samples were analysed in Mandi district, out of those 3 samples showed presence of pesticide residues levels above MRL values.

Calotropis gigantean is a wild medicinal herb growing almost all over India. It has yellow chlorotic symptoms which show the presence of virus. To date no work on the virus studies has been reported. The virus has been transferred to the host *Nicotiana* species by mechanical inoculation. The host plants show mosaic like symptoms. The protocol for the virus like particle (VLP) has been standardized. The peptide analysis of virus has been done which shows band approximately 55-60kDa. The VLP-DNA of virus has been isolated. The cloning process of DNA in a suitable vector is under progress.

Highlight-IV

Variation in Biochemical parameters of Buckwheat, Chenopods and Adzuki bean genotypes procured from NBPGR, Shimla.

Biochemical evaluation of 40 genotypes of buckwheat, 28 genotypes of chenopods and 27 genotypes of adzuki bean obtained from NBPGR, Phagli, Shimla was carried out for following quality parameters by following standard procedures and the pertinent data is presented as under:-

1. **Variation in crude protein, total phenol and minerals content of buckwheat genotypes**

The crude protein, total phenols, tryptophan, methionine, calcium, iron, sodium and potassium content in buckwheat genotypes varied from 9.8 to 14.0%, 120 to 280 mg/100, 0.63 to 0.99 g/100 g protein,0.80 to 1.73 g/100 g protein, 54.1 to 99.8 mg/100, 2.9 to 8.8 mg/100, 1.7 to 4.6 mg/100 and 259 to 594 mg/100, respectively.

The genotype(s) IC-36914 & IC-108516 in crude protein; RSRISKS-106 & IC-412762 in total phenols; Himpriya & EC-286377 in tryptophan; IC-26597 & PRB-1 in methionine; RSRISKS -41 &EC-321798 in calcium; EC- 286377 & EC-286379 in iron; IC-329403 & EC- 216622 in sodium and IC-26598 & IC-329403 in potassium content were adjudged superior over the rest.

2. **Variation in crude protein and minerals content of Chenopods genotypes**

Average range of crude protein, calcium, iron, potassium and sodium content in chenopod genotypes were found to be 13.8 to 18.0%, 153 to 510 mg/100g, 7.8 to 14.7 mg/100g, 1.5 to 3.4 mg/100g and 1.8 to 7.9 mg/100g in that order. The minimum and maximum values for crude protein, calcium, iron, sodium and potassium content in chenopod genotypes were observed in 13.8(NIC-22529) to 18.0%(IC-415493), 153(IC-108819) to 510(NIC-22503), 7.8(IC-258332) to 14.7mg/100g(IC-415493), 1.5(IC-108080) to 3.4mg/100g(NIC-22518) and 1.8(NIC-22503) to 7.9mg/100g (NC-58233) in that order.

3. **Variation in crude protein, total phenol content and antioxidant activity of Adzuki bean genotypes**

The crude protein ,total phenol and antioxidant activity in adzuki bean genotypes ranged from 17.1 to 23.8% , 145 to 285 mg/100g and 21.14 to 90.57 (% inhibition)

accordingly. The genotype(s) IC-108854 & EC-340288 in crude protein, EC-340254 & EC-000249 in total phenol and IC-024522 & EC-087896 in antioxidant activity emerged promising genotypes over others, in that order.

As such based on the above biochemical analysis it is evident that promising genotypes for individual quality parameters of dietary significance among buckwheat, chenopods and adzuki bean genotypes have been identified for further crop improvement purpose.

Table 1(A): Variation of crude protein, total Phenols, tryptophan and Methionine in Buckwheat genotypes

Genotypes	Crude protein (%)	Total Phenols (mg/100g)	Tryptophan (g/100g Protein)	Methionine (g/100g Protein)
IC -13140	12.8	130	0.66	1.32
IC-13143	12.0	240	0.76	1.16
IC -26596	11.8	170	0.80	1.24
IC -26597	12.5	240	0.93	1.73
IC -26598	11.6	190	0.65	1.60
IC -26599	12.7	230	0.63	1.24
IC -26600	11.4	155	0.83	1.32
IC -36805	13.3	169	0.95	1.45
IC -36914	14.0	172	0.84	1.21
IC -37265	10.1	145	0.88	1.37
IC -42426	9.8	175	0.92	1.24
IC -107988	11.4	200	0.73	1.45
IC -108516	13.6	210	0.86	1.46
IC -109309	10.5	120	0.79	1.1
IC – 204020	10.9	185	0.68	1.14
IC – 213685	12.5	250	0.82	1.2
IC – 274429	12.2	190	0.87	0.99
IC -274435	13.0	140	0.89	1.23
IC – 310043	12.3	130	0.69	1.46
IC – 329149	11.9	260	0.86	1.12
IC – 329200	10.7	200	0.66	0.80
IC – 329403	13.4	150	0.90	1.39
IC – 329495	13.1	230	0.78	1.43
IC – 412762	12.0	265	0.87	0.85
EC -18225	12.8	210	0.68	1.2
EC – 104035	10.9	190	0.76	0.86
EC -131602	11.9	240	0.71	1.1
EC – 216622	12.8	199	0.74	1.2
EC – 218739	11.7	215	0.81	1.52
EC-286521	12.0	225	0.70	1.08
EC-286379	11.3	180	0.77	1.49
EC-286377	12.3	235	0.98	1.23
EC-321798	10.9	200	0.79	1.48
RSRISKS-41	11.8	210	0.64	1.29
RSRISKS-71	11.4	140	0.72	1.45

RSRISKS-106	13.1	280	0.79	1.52
Himpriya*	**10.9**	**240**	**0.99**	**1.62**
Shimla B-1*	**10.5**	**255**	**0.84**	**1.50**
PRB-1*	**13.1**	**190**	**0.68**	**1.66**
VL-7*	**11.8**	**230**	**0.75**	**1.32**
Minimum	**9.8**	**120**	**0.63**	**0.80**
Maximum	**14.0**	**280**	**0.99**	**1.73**
Mean	**11.4**	**188.4**	**0.79**	**1.3**
Range	**9.8-14.0**	**120-280**	**0.63-0.99**	**0.80-1.73**

***Check Genotypes**

Table 1(B): Variation of minerals contents in Buckwheat genotypes

Genotypes	Calcium (mg/100 g)	Iron (mg/100 g)	Sodium (mg/100g)	Potassium (mg/100g)
IC -13140	86.4	6.2	2.6	259
IC-13143	89.2	4.1	3.0	345
IC -26596	97.9	5.6	3.2	576
IC -26597	73.5	5.0	2.7	483
IC -26598	63.5	6.9	2.9	594
IC -26599	92.8	5.2	3.4	506
IC -26600	83.4	4.2	2.5	370
IC -36805	63.4	5.3	2.7	310
IC -36914	63.5	4.3	3.0	455
IC -37265	89.4	4.0	2.5	463
IC -42426	98.5	5.1	3.4	525
IC -107988	93.8	5.3	2.0	339
IC -108516	97.9	8.2	2.3	495
IC -109309	96.4	6.6	2.7	510
IC - 204020	98.3	8.0	2.5	545
IC - 213685	87.5	4.7	1.7	324
IC - 274429	92.4	8.6	3.6	280
IC -274435	89.2	6.5	3.0	411
IC - 310043	97.5	5.2	2.4	529
IC - 329149	62.3	5.8	3.8	511
IC - 329200	76.9	4.9	3.7	400
IC - 329403	83.4	4.7	4.6	588
IC - 329495	98.4	4.8	2.9	290
IC - 412762	82.6	4.4	3.2	356
EC -18225	94.3	4.7	3.9	582
EC - 104035	59.3	3.4	2.0	540
EC -131602	72.3	2.9	2.5	529
EC - 216622	86.3	5.3	4.5	296
EC - 218739	55.8	8.4	1.9	356
EC-286521	79.3	8.3	2.9	436
EC-286379	89.9	8.5	3.0	547
EC-286377	84.5	8.8	3.3	314
EC-321798	98.5	5.4	3.6	295
RSRISKS-41	99.8	5.0	2.4	360
RSRISKS-71	96.8	3.9	2.8	570

RSRISKS-106	85.4	4.7	3.0	564
Himpriya*	**98.2**	**5.0**	**4.1**	**350**
Shimla B-1*	**58.7**	**5.1**	**4.5**	**460**
PRB-1*	**54.1**	**7.0**	**2.6**	**292**
VL-7*	**95.2**	**4.1**	**3.3**	**380**
Minimum	**54.1**	**2.9**	**1.7**	**259**
Maximum	**99.8**	**8.8**	**4.6**	**594**
Mean	**84.2**	**5.6**	**3.0**	**433**
Range	**54.1-99.8**	**2.9-8.8**	**1.7-4.6**	**259-594**

***Check Genotypes**

Table 2: Variation in crude protein and minerals contents of Chenopod genotypes

Genotypes	Crude protein (%)	Calcium (mg/100 g)	Iron (mg/100 g)	Sodium (mg/100 g)	Potassium (mg/100 g)
EC- 359449	14.0	332.0	14.5	3.2	3.3
IC- 415493	18.0	200.0	14.7	3.1	6.4
NIC- 22498	16.9	438.0	9.6	2.9	3.5
NC- 58233	15.4	250.0	11.6	2.3	7.9
PRC- 9801*	**14.9**	**434.0**	**11.9**	**1.8**	**4.5**
NC- 58616	16.3	474.0	8.2	1.6	5.6
NIC- 22500	14.2	410.0	13.6	2.4	3.9
NIC- 22503*	**16.8**	**510.0**	**9.7**	**3.0**	**1.8**
EC- 359448	16.4	166.0	8.1	2.4	3.9
EC- 359444	16.2	314.0	13.0	2.8	4.0
NIC- 22518	14.0	352.0	12.5	3.4	5.6
IC- 258332	14.9	318.0	7.8	2.5	4.6
NC- 58617	14.4	194.0	9.0	2.2	5.6
IC- 109731	16.8	162.0	9.5	2.6	3.8
NIC- 22489	15.8	255.0	8.2	3.0	4.6
EC- 507741	15.0	263.0	11.0	2.3	3.3
IC- 108080	17.6	208.0	9.6	1.5	4.0
NIC- 22529	13.8	192.0	11.9	1.9	5.0
NIC- 50229	15.5	500.0	12.5	2.6	6.8
IC- 108819	17.0	153.0	12.0	2.3	2.8
EC- 349447	16.0	153.0	9.0	2.6	2.7
IC- 415477*	**15.5**	**237.0**	**11.6**	**2.9**	**3.6**
IC- 109235	14.0	232.0	9.9	2.1	4.4
IC- 108817	16.8	434.0	14.0	2.3	3.4
IC- 275421	16.0	426.0	9.8	2.6	6.0
IC- 341704	16.4	330.0	14.4	2.5	5.4
NIC- 22525	14.5	424.0	14.1	2.9	6.8
IC- 109249	15.7	400.0	11.3	3.3	5.3
Minimum	**13.8**	**153.0**	7.8	**1.5**	**1.8**
Maximum	**18.0**	**510.0**	**14.7**	**3.4**	**7.9**
Mean	**15.7**	**312.9**	**11.2**	**2.5**	**4.6**
Range	**13.8-18.0**	**153.0-510.0**	**7.8-14.7**	**1.5-3.4**	**1.8-7.9**

***Check Genotypes**

Table 3: Variation in crude protein, total phenol and Antioxidant activity of Adzuki bean genotypes

Genotypes	Crude protein (%)	Total Phenol (mg/100g)	Antioxidant Activity (% Inhibition)
EC-000248	18.8	275	83.02
EC-000249	17.2	280	85.70
EC-000372	18.8	165	79.04
EC-008707	21.9	160	76.85
EC-015257	20.6	155	82.32
EC-018257	23.2	240	75.21
EC-034264	20.1	165	28.17
EC-036070	22.8	190	90.00
EC-59489	17.1	250	37.14
EC-080850	19.3	230	28.84
EC-087071	16.6	170	27.10
EC-087815	17.5	250	90.57
EC-087896	21.2	200	23.36
EC-281186	22.4	260	67.23
EC-340245	23.0	145	44.80
EC-340254	20.6	285	81.13
EC-340286	21.8	250	65.55
EC-340287	20.0	215	72.13
EC-340288	23.6	265	89.35
IC-024522	21.4	165	21.14
IC-030270	21.6	200	81.00
IC-108854	23.8	235	54.71
IC-108857	22.3	210	76.14
IC-341941	22.8	175	70.80
IC-341944	23.2	240	85.86
HPU-51*	**20.5**	**155**	**40.20**
Totru-local*	**21.8**	**265**	**84.21**
Minimum	**17.1**	**145**	**21.14**
Maximum	**23.8**	**285**	**90.57**
Mean	**20.9**	**215**	**64.50**
Range	**17.1-23.8**	**145-285**	**21.14-90.57**

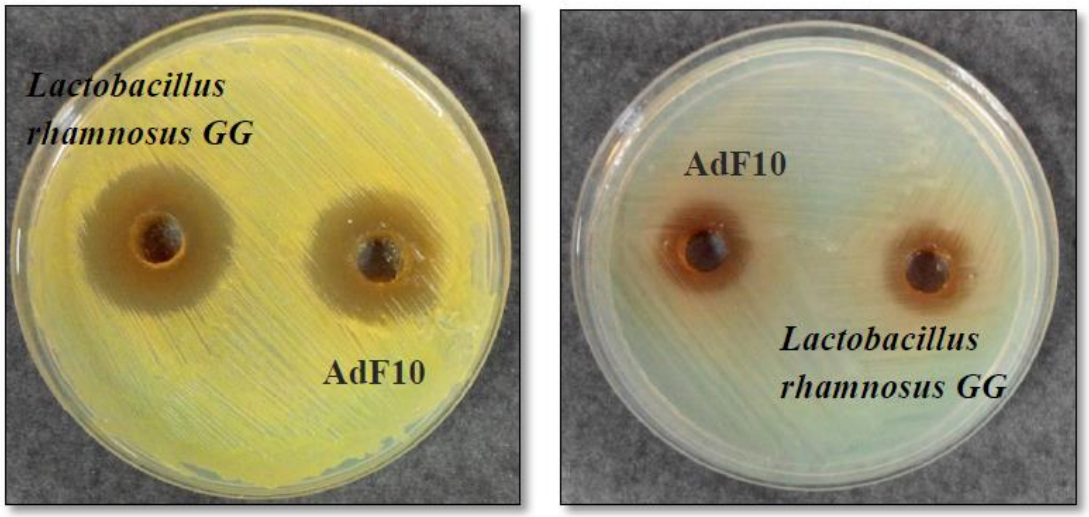
***Check Genotypes**

Highlight-V

Optimization and interaction studies of indigenous probiotics and their comparison with probiotic microorganisms in commercial food products

Six indigenous probiotic isolates *viz*., AdF5 (*Lactobacillus plantarum*), AdF6 (*Lactobacillus plantarum*), AdF7 (*Lactobacillus fermentum*), AdF8 (*Lactobacillus fermentum*), AdF9 (*Lactobacillus fermentum*) and AdF10 (*Lactobacillus plantarum*) were used along with the

reference strain *Lactobacillus rhamnosus* GG for optimization of growth conditions for their mass cultivation. Five parameters i.e. carbon source, nitrogen source, pH, temperature and incubation time were optimized by using Response Surface Methodology (RSM). The most effective carbon source was found to be molasses {11 per cent (v/v)} for all isolates. The best nitrogen source was observed to be peptone {1.25 per cent (w/v)} for all seven isolates. The optimum pH, temperature and incubation time were 6.25, 32.5ºC and 48 hours, respectively for all the isolates. Under optimized conditions, an overall increase in growth of all isolates was observed. It was also found that, formulated medium for different species of *Lactobacillus* was 4.13 times less expensive than their commercial medium i.e. Man Rogosa Sharpe (MRS) broth. Moreover, no probiotic trait was lost by these isolates after optimizing their growth conditions in formulated medium. All the isolates exhibited antagonistic activity against *Shigella flexineri, Escherichia coli, Pseudomonas aeruginosa, Staphylococcus aureus* and *Bacillus cereus*. However, AdF10 (*L. plantarum*) and *L. rhamnosus* GG were found to be most effective against foodborne pathogens. A total of 4 bacteria were isolated from commercial food products viz., Amul Probiotic Ice-cream, Nestle Baby & Me and Yakult. All the commercial isolates were screened for different probiotic traits. The commercial bacterial isolates were identified by using traditional and molecular techniques. Isolated bacteria were identified as L1 (*Lactobacillus*), L2 (*Lactobacillus rhamnosus* GG), L3 (*Lactobacillus casei*) and L4 (*Bifidobacterium lactis*). These commercial isolates were then compared with indigenous probiotic isolates i.e. *Lactobacillus plantarum* (ADF5), *Lactobacillus plantarum* (ADF10) and reference strain *Lactobacillus rhamnosus* GG-ATCC53103. On comparison of commercial probiotic bacteria with the indigenous probiotic bacteria as well as reference strain, the indigenous isolates were found to be better with respect to probiotics attributes as compared to probiotic bacterial isolates obtained from commercial food products.



Antagonistic activity of AdF10 (*L. plantarum*) and *Lactobacillus rhamnosus GG* against (a) *Staphylococcus aureus*-MTCC 96, (b) *Pseudomonas aeruginosa*- MTCC 741

Highlight-VI

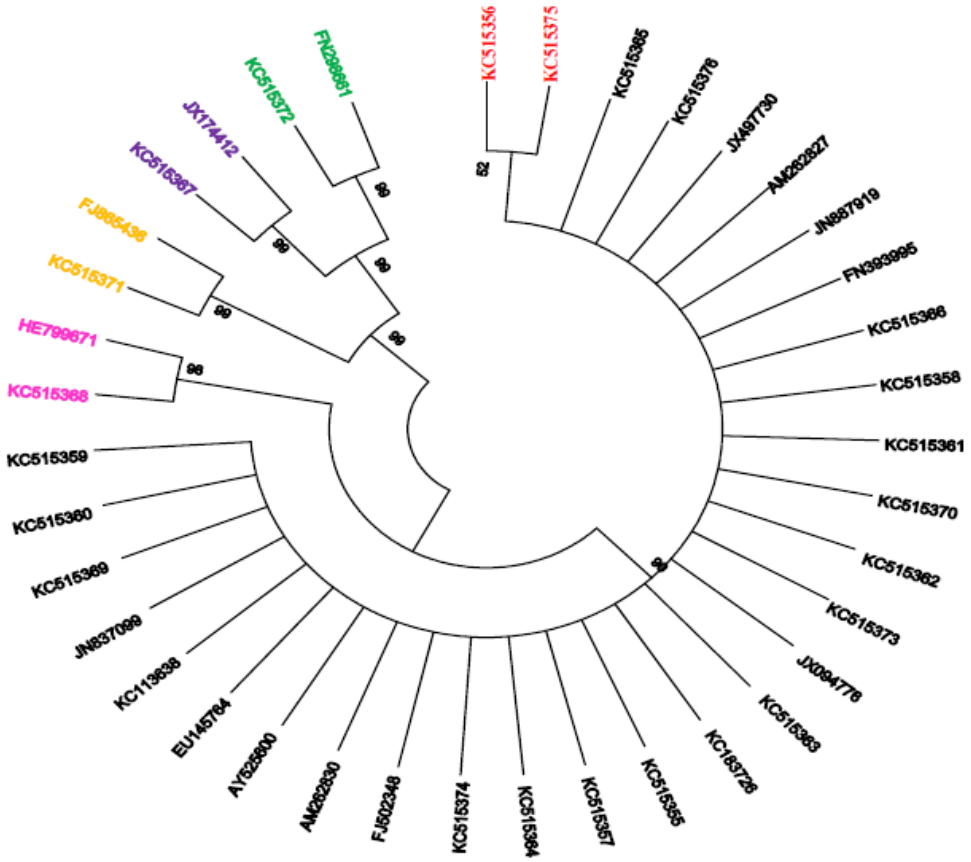
Diversity studies

i) Salt tolerant bacteria in Himachal Pradesh

Salt tolerant nitrogen fixing bacteria were isolated from rhizospheric soils of four selected plants *viz., Lantana camara, Muraya koenigii, Taraxacum officinale* and *Cynadon dactylon* abundantly growing around the salt mines of Himachal Pradesh. A total of 473 nitrogen fixing bacterial isolates were obtained at different media and among them 179 were salt tolerant nitrogen fixing bacteria. Forty nine salt tolerant bacteria were found to be positive for acetylene reduction assay. Seven bacterial isolates were selected as efficient salt tolerant nitrogen fixing bacteria and found to be positive for other PGPR traits. Out of seven bacterial isolates, isolate SNC9, was found to tolerate salt (NaCl) upto 15% and six isolates i.e. SNC10, SNT5, SNC28, SNL18, SNL19 and SNM6 were found to tolerate upto 10%. All the seven efficient salt tolerant bacterial isolates were found to show growth at pH 6-11 and temperature from 15-45 0 C. Seven bacterial isolates were identified by 16srRNA sequencing and identified as *Enterobacter ludwigii, Enterobacter cloacae, Bacillus aquimaris, Bacillus aquimaris, Bacillus vietnamensis* and *Bacillus vietnamensis.* On the basis of their PGPR traits, *Enterobacter ludwigii* was found to be efficient strain to promote the growth of Tall fescue plant and found to mitigate the effect of salt and diesel oil upto 5%. Significant variations were observed in nucleotide as well as amino acid sequences of *nhaA* gene among high and low salt tolerant strains, conferring the role of this gene in salt tolerance behavior of the selected strains.

ii) Molecular and functional diversity of *Saccharomyces cerevisiae* population from North-Western Himalayan region

Internal transcribed spacer region was used to discriminate eighteen *Saccharomyces cerevisiae* strains isolated from North-Western Himalayas and to compare them with other known lineages available in the literature. The phylogenetic tree obtained after analysis, grouped these strains into two clusters, first comprising of Malaysian, North American, Sake, West African and Wine/European strains and second comprising of all the Indian strains along with certain other strains from different countries. In both the clusters, region based grouping was observed to some extent. For functional diversity, exposition of baking and brewing abilities of these strains were studied. Four strains viz. Sc06, Sc11, Sc19 and Sc20 were found promising for baking and three strains viz. Sc04, Sc05 and Sc24 were found promising for brewing, thereby indicating the existence of functional diversity. Out of 18 *S. cerevisiae* strains, only one strain Sc02 was found positive for killer toxin production. At genetic level, phylogenetic tree obtained from mining of *ADH1* gene of ten randomly selected yeast strains, showed a very little variation in the gene sequence irrespective of their alcohol production ability, and most of them clustered together according to their geographical origin. However, mining of *ATF1* gene showed a lot more variation in the gene sequences without depicting any region based clustering behavior. Thus *ATF1* gene seems to be an appropriate tool to reveal differences among these indigenous *S. cerevisiae* strains. Organoleptic studies of six native yeast strains suggested Sc21 as the potential candidate for soft cider whereas, Sc01 for hard cider. A wide variation was observed in bio-emulsifier production; the maximum emulsification activity was recorded in Sc10 (64.82%) yeast strain. KC515356 KC515375



Phylogenetic tree of *S. cerevisiae* and other yeast strains on the basis of ITS region sequencing

iii) Aerobic culturable thermophiles in Himachal Pradesh

For deciphering aerobic culturable diversity of thermophiles from Manikaran hot spring, three different types of sample *viz.* water, soil (sediment) and biomat were collected from upper Manikaran, lower Manikaran and Shangna. A total of 108 bacterial isolates were obtained and majority of them were facultative (58.33 %) followed by thermotolerant (21.30 %) and obligate thermophiles (20.37%). A significantly higher bacterial load was observed in biomat (5.44 log CFU/mL) as compared to sediment (4.84 log CFU/mL) and water (4.13 log CFU/mL) samples. No fungal isolate was obtained by using different techniques and a strong antifungal activity was observed in the water of Manikaran hot spring which is probably mediated through some volatile antifungal compounds. Screening of all the isolates for extracellular enzymes production revealed that lipase, cellulase, protease and amylase producing isolates were 84.26, 74.07, 43.52 and 42.59 per cent, respectively. None of the isolates was found positive for pectinolytic activity. Most of the isolates were multienzyme producers. Only seven efficient protease producers *viz.* S6, W15, B48, EpW3, BB4, EpSA1 and EpWB1, were examined quantitatively for protease production. Out of these, five isolates were found to exhibit optimum protease activity at 45°C while, two isolates at 55°C. Out of seven, five isolates were found to exhibit optimum protease activity at pH 7.0 while, one at pH 8.0 and one at 6.0. Analyses of thermostability profiles of crude proteases of W15 and EpSA1 showed that their half lives at 60 and 65ºC were 30 and 15 min, respectively. Whereas, the half lives of B48, EpW3 and BB4 at 55 and 60ºC were 30 and 15 min, respectively. Half lives of crude protease of S6 at 70 and 75ºC were 30 and 15 min, respectively while, the half lives of crude protease of EpWB1 at 70, 90 and 100ºC were 60 , 30 , and 15 min, respectively.

Thus, crude protease of EpWB1was found the most stable among these isolates. SDS-PAGE analysis of extracellular crude protease of EpWB1 revealed that it is made up of three polypeptide chains having different molecular weights i.e 20.0, 40.0 and 250 kDa. The isolate EpWB1 was identified as *Thermoactinomyces vulgaris* on the basis of 16S rRNA gene sequence analysis.

iv) Cow horn manure

Cow horn manure was explored for its microbial diversity and antagonistic potential against selected plant pathogens. The population of aerobic bacteria decreased, whereas, anaerobic bacteria, actinomycetes and yeasts increased upon the maturation of cow horn manure. No fungal population was observed in any sample of cow horn manure. A total of 47 aerobic and 22 anaerobic gram positive, motile, endospore forming, rod shaped bacteria from cow horn manure were isolated and tested for their antagonistic as well as plant growth promoting potential. Among 47 aerobic bacterial isolates, 13 showed antagonistic activity against all the selected phytopathogens, however, only 8 isolates had shown antagonistic activity in their cell- free supernatants. These 8 potential isolates were characterized on the basis of 16S rRNA gene sequencing and identified as *Bacillus subtils*, *B. cereus, B. thuringiensis*, *B. mojavensis*, *B. tequilensis*, *B. axarguensis*, *B. amyloliquefaciens,* and *B. methylotrophicus*. These bacterial isolates were found positive for various plant growth promoting attributes *viz.*, nitrogen fixation, phosphate solubilization, IAA production, siderphores production, zinc solubilization and ammonia production. Four out of twenty two anaerobic bacterial isolates showed antagonistic activity against all the selected phytopathogens in their cell- free supernants. These bacterial isolates were characterized as B. *subtilis,* B. *cereus*, and B. *thuringiensis* on the basis of 16S rRNA gene sequencing. These anaerobic bacteria belonging to different specis of *Bacillus* exhibited high phosphate solubilization, zinc solubilization and nitrogen fixation under anaerobic conditions. This is first study where anaerobic *Bacillus* exhibiting plant growth promoting potential under anaerobic conditions has been reported from cow horn manure. The biocontrol and plant growth promoting activity of cow horn manure seem to be the cumulative effect of aerobic and anaerobic microbial population that developed during the maturation of cow horn manure.

V. RESEARCH PUBLICATIONS

A. Paper Published

4. Walia S, Kamal R, Kanwar SS, Dhawan DK (2015). Cyclooxygenase as a target in chemoprevention by probiotics during 1,2-dimethylhydrazine induces colon carcinogenesis in rats. *Nutrition and Cancer*. 67 (4): 603-611.

5. Keshani, Sharma PN, Sharma KD and Kanwar SS (2015). Molecular and functional diversity of *Saccharomyces cerevisiae* strains of traditional fermented foods of North-Western Himalayas. *Annals of Microbiology* (Accepted).

6. Kanwar SS, Walia S, Sharma S (2015). Impact of probiotics and gut microbiota on host behavior *In* Microbes in Food and Health (Eds.) Neelam Garg, Shadia Mohammad Abdel-Aziz and Abhinav Aeron. *Springer publishers* (In Press).

7. Kanwar SS, Sharma S, Walia S, Keshani (2015). Nanoscale materials as novel antimicrobial agents *In* Microbiology- Current Trends (Ed.) P.C. Trivedi. *Pointer publishers* (In Press).

8. Sharma S, Kanwar SS (2015). Antagonistic potential of indigenous bacterial probiotics of North-Western Himalayas against anaerobic bacterial pathogens. *Annals of Microbiology* (Under Review).

9. Patial,Madhu.,Chauhan,A.,Singh,K.P (2014) Character association and path coefficient analysis in Grain Amaranth (Amaranthus spp.). International Journal of Agriculture,Environment and Biotechnology 7(1) : 101-106.

10. Patial,Madhu.,Chauhan,A., Sood,R and Singh.K.P(2014) Radiation induced variability and gene effects for polygenic traits in ricebean (Vigna umbellate Thumb, Ohwi and Ohasi) . Asian Journal of Bioscience 9(1) : 53-57.

11. Malik Sudha Sambyal, Chauhan Ramesh C, Laura, J.S., Kapoor Tanvi, Abhilashi Raashee and Sharma Natasha.2014. ‘’Influence of Organic and Synthetic Fertilizers on Soil Physical Properties’’. *International Journal of Current Microbiology and Applied Science*3 (8) : 802-810.

12. Malik Sudha Sambyal and Chauhan Ramesh C.2014. "Impact of Organic Farming on Soil Chemical Properties". *Journal of International Academic Research for Multidisciplinary* 2(7) : 350-360.

13. Seth Parul and Chauhan Ramesh C. 2015. "Status of Biomedical Waste Management-A Case Study in and around Palampur". *Journal of International Academic Research for Multidisciplinary* 2(12) : 231-239.

14. Sen Vijayshri, Rana R.S; Chauhan Ramesh C and Aditya.2015. "Impact of climate variability on apple production and diversity in Kullu valley, Himachal Pradesh". *Indian Journal of Horticulture* 72 (1): 14 -20.

15. Bhardwaj Akanksha and Chauhan Ramesh C. 2015. "Relationship among Physico-chemical Characteristics of Khajiyar lake, District Chamba, Himachal Pradesh". *Journal of Environment and Bio-Sciences* 29 (1): 231-233.

16. Singh, V. and Rajesh Gupta 2015. fatty acid composition of fruit pulp and seed oils of Himalayan seabuckthorn (*Hippophae* l). *International Journal of Food and Nutritional Sciences*. 4 (1): 91-100.

17. Singh, V. , L.K. Sharma2 and R. K Rana 2015. Evaluation of some exotic forms of seabuckthorn (*Hippophae rhamnoides* ssp. *mongolica*) in cold desert Himalayas. *Annals of Plant Sciences* 4 (3): 1003-1007.

18. Sharma, P., Geetha Suryakumar, Virendra Singh, Kshipra Misra, Shashi Bala Singh 2014. In vitro antioxidant profiling of seabuckthorn varieties and their adaptogenic response to high altitude-induced stress. *Int. J. Biometeorol*. DOI 10.1007/s00484-014-0925-2.

19. Evaluation if interaction effect of drought stress with ABA,calcium and potassium on physiological parameters in common bean (*Phaseolus vulgaris* L.) *Journal of Environment and Bio-Sciences* 29 (1):125-127.

20. Babli Devi, Anita Singh and RG Upadhyay. Chlorophyll and protein content variability in Giloya (*Tinospora cordifolia*(Wild) Mires).Indian Journal of Agricultural Research.(Accepted)

21. RG Upadhyay and Anita Singh. Effect of nitrogen and zinc on nodulation , growth and yield of cow pea (*Vigna unquiculata* L.). Legume Research- An International Journal (Accepted)

22. **Sharma Neelam,** Kumar Suresh, Chopra Pankaj, Joshi Robin and Kumari Suman 2014. Herbicide usage and residues in vegetable crops of Kangra District of Himachal Pradesh. *Journal of Environment and Biosciences*Vol.28(2) 261-264

23. Reetu, **Sharma Neelam** and Joshi Robin 2014. Influence of Pretilachlor on Proximate Nitrate Reductase Activity, Protein Content in Rice Leaves and its Relation to Grain Protein. *Pesticide Research Journal* Vol26(2)193-196

24. Thakur ,Nitasha, **Sharma, Neelam,** Sharma, Esha and Kumar, Suresh 2014 .Effect of Herbicides (alone or in combination) on photosynthetic pigments and carbohydrate content in Wheat (*Triticum aestivum L.*) *Journal of Environment and Biosciences* Vol.28(2) 155-158

25. **Sharma Neelam**, Kumar Suresh, Angiras N.N. and Sehgal Sweta 2014. Evaluation of pendimethalin residues in garlic. *Indian J. Weed Sci.* 46(4): 374–377, 2014

26. Sharma Neelam, Thakur Nitasha, Kumar Suresh, Chopra Pankaj, Joshi Robin and Kumari Suman. 2015 Monitoring of dithiocarbamate based fungicide residues in vegetable crops of mandi district of Himachal Pradesh. *Journal of Environment and Biosciences*., Vol. 29 (1):227-230

27. Bandana, **Sharma, Neelam**, Joshi, Robin Gulati, Ashu and Sondia Shoba 2015. Dissipation kinetics of glyphosate in tea and tea-field under northwestern mid-hill conditions of India Journal of Pesticide Science. **(**February 2015, DOI: 10.1584/jpestics.D14-085)

28. Reetu, **Singh Nageswer** and Rana Anita **2015.** Impact of some important phytochemicals of *murraya koenigii* (l.) Spreng on altitudes. ***World Journal of Pharmacy and Pharmaceutical Sciences. 4(04): 1631-1637.***

B. Papers Presented in Conferences and Workshops

1. Dr Neelam Sharma participated and Oral paper presentation in 1st Himchal Pradesh Science Congress on "Role of Science & Technology in Sustainable Development in H.P." on 15-16 oct 2014 held at Shimla.

2. Dr Neelam Sharma participated and acted as resource person in Training-cum-workshop on "Herbicide Residue: Review of Research-cum-training workshop" held at the Directorate of weed science Research (ICAR),Jabalpur from 11-17 November,2014

3. Dr. Nageswer Singh presented Annual Report of ICAR ad hoc project entitled "**Evaluation of nutritionally important biochemical constituents of promising Adzuki bean, Buckwheat and Chenopod genotypes**" at 26th Group Meet of All India Coordinated Research Network on Potential Crops at Bhubaneswar, Orissa during April 10-11, 2015

4. Sharma S, Kanwar SS (2014). Antagonistic potential of indigenous bacterial probiotics of North-Western Himalayas against anaerobic bacterial pathogens. In 2nd Annual Conference of Probiotic Association of India and the International Symposium on "Probiotics and Microbiome: Gut and Beyond" held at India Habitat Centre, New Delhi on November 3-4, 2014 pp: 66-67.

5. Devi S and Kanwar SS (2015). Deciphering the diversity of aerobic culturable thermophiles in the hot spring of Manikaran, Himachal Pradesh. In National Symposium on "Modern Agro-Technologies for Nutritional Security and Health" organized by Society for Advancement of Human and Nature (SADHNA) at Dr YS Parmar University of Horticulture and Forestry, Solan on 21-23, April 2015 p 236.

Paper presented in 35th Annual Conference of Indian Association of Biomedical Scientists on "Environment and Health" held at CSK HPAU, Palampur from November 14-16, 2014:

6. Sharma S, Kanwar SS (2014). Evaluation of growth of indigenous bacterial probiotics in different prebiotics and their antagonistic activity against anaerobic pathogens p 26.
7. Sharma D, Shivani Anand, Rana K, Mal G, Singh B (2014). Isolation of bacteria producing antagonistic substances from gastrointestinal tract of wild and feral animals p 27.
8. Sahu AR, Sharma D, Mal G, Bhar R, Kannan A, Sharma R, Keshani, Singh B (2014). Molecular characterization of tannase genes of selected rumen microorganisms isolated from migratory goats and sheep p 28.
9. Walia S, Kamal R, Kanwar SS, Dhawan DK (2014). Evaluation of indigenous probiotics of Himachal Pradesh for protective attributes in experimentally induced colon carcinogenesis p 37.
10. Thakur B, Kanwar SS (2014). Comparative evaluation of commercial food-borne [robiotics with indigenous probiotics of fermented foods p 50.
11. Keshani, Walia S, Kanwar SS (2014). Evaluation of efficiency of indigenous *Saccharomyces cerevisiae* strains in providing healthy food products p 54.
12. Kapoor R, Kumar N, Kanwar SS (2014). Bioremediation of petroleum contaminated soils by *Enterobacter ludwigii* p 93.
13. Adesokan IA, Sanni AI, Lachance MA, Kanwar SS (2014). In vitro evaluation of probiotic properties of indigenous yeasts isolated from Nigerian fermented food products p 53.

14. Ruchi, Kanwar SS (2014). Optimization of conditions of plant growth promoting *Rhizobacteria* of Himachal Pradesh through response surface methodology for their mass cultivation p 69.

15. Chauhan A, Kanwar SS (2014). Studies on exopolysaccharide production by indigenous lactic acid bacteria p 73.

16. Rana K, Kanwar SS (2014). Purification and characterization of bacteriocin(s) of *Enterococcus* spp. obtained from fermented foods of Himachal Pradesh p 74.

17. Devi S, Kanwar SS (2014). Antifungal potential of hot spring water of Manikaran, Himachal Pradesh (India) p 94.

C. Technical Reports Submitted

Dr Neelam Sharma

- Annual Progress Report of UGC Adhoc Project
- Annual Progress Report of AICRP on Weed Management
- Annual Progress Report of Department of Chemistry & Biochemistry

Dr. Nageswer Singh

Annual Report of ICAR ad hoc project entitled "**Evaluation of nutritionally important biochemical constituents of promising Adzuki bean, Buckwheat and Chenopod genotypes**"

VI. WORKSHOPS/ SEMINARS/ TRAINING PROGRAMMES ATTENDED

Dr Neelam Sharma

- Participated in the interactive workshop on "Gender sensitivity and prevention and Redressal of sexual harassment of women at workplace" on 17-18 July, 2014 at New Delhi.
- Participated in 102nd Indian Science Congress on "Science and Technology for Human Development" held in Mumbai *w.e.f* 03-07 Jan 2015
- Attended Awareness seminar on "Weather, Climate and Farmers" organized by Department of AFGM, CSKHPKV,Palampur on 27 March,2015
- Attended Agricultural Officers Workshop for Kharif Crops 2015 on 12 May, 2015 held at Directorate of Extension Education, CSHPKV, Palampur
- Attended Awareness–cum-Demonstration on e-learning portal on Agricultural Education (e-Krishi Shiksha) on 11 June,2015 at Directorate of Extension Education, CSHPKV, Palampur

Dr. Nageswer Singh

- Attended workshop 26th Group Meet of All India Coordinated Research Network on Potential Crops at Bhubaneswar, Orissa during April 10-11, 2015.

VII. BOOKS/ BOOK CHAPTERS

i) Book:

1. Book entitled "tyok;q ifjorZu ,oa ioZrh; [ksrh" Edited by Ranbir Singh Rana, Published from Directorate of Research, CSKHPKV, Palampur, October, 2012.

ii) Book Chapter:

1. Sharda Singh, Kunal Sood , Arun Kaushal, Vaibhav Kalia and Ranbir Singh Rana entitled "Agriculture Spatial Info and Decision Support System – A Customised Application for the State of Himachal Pradesh" in Book namely "Geospatial Technolgies for Natural Resources Management" edited by S.K.Soam, P.D. Sreekanth and N.H.Rao (2013); ISBN:978-93-81450-80-2; pp 395-405.
2. Sharda Singh, Ranbir Singh Rana, Kunal Sood, Arun Kumar, Sunil Kumar and Nutan Sharma 2012. fgekpy izns'k esa cSo th vkÃ ,l ,ao LFkkuh; Hkw lwpuk ra= % fdlkuks dks Ñf"k; lwpuk igqapkus dk ,d izHkko'kkyh fodYiA In Edited book "tyok;q ifjorZu ,ao ioZrh; [ksrh" by Ranbir Singh Rana, Sharda Singh and Vaibhav Kalia Published by Directorate of Research CSKHPKV, Palampur. page 85-102
3. Ranbir Singh Rana, Rajiv Mohan Bhagat, Ruchi Sood and Rohit Sharma 2012. fgekpy izns'k esa tyok;q ifjorZu% izHkko ,ao lwpdA In Edited book "tyok;q ifjorZu ,ao ioZrh; [ksrh" by Ranbir Singh Rana, Sharda Singh and Vaibhav Kalia Published By Directorate of Research CSKHPKV, Palampur. page 01-06
4. Ranbir Singh Rana, Naval Chander, Ruchi Sood and Vijayshree sen 2012. tyok;q ifjorZu ds izeq[k dkj.k ,ao uqdlkuA In Edited book "tyok;q ifjorZu ,ao ioZrh; [ksrh" by Ranbir Singh Rana, Sharda Singh and Vaibhav Kalia Published By Director ate of Research CSKHPKV, Palampur. page 07-12
5. Ranbir Singh Rana,Rajeev Mohan Bhagat, Vaibhav Kaliya and Harvans Lal 2012. fgekpy izns'k ds ioZrh; {ks=ksa esa tyok;q ifjorZu% fdlkuks dh jk;! In Edited book "tyok;q ifjorZu ,ao ioZrh; [ksrh" by Ranbir Singh Rana, Sharda Singh and Vaibhav Kalia Published By Director ate of Research CSKHPKV, Palampur. page 13-16
6. Ranbir Singh Rana,Naval Chander, Rohit Sharma and Ruchi Sood 2012. fgekpy izns'k dh Qlyksa ij tyok;q ifjorZu ds izHkko In Edited book "tyok;q ifjorZu ,ao ioZrh; [ksrh" by Ranbir Singh Rana, Sharda Singh and Vaibhav Kalia Published By Director ate of Research CSKHPKV, Palampur. page 17-20
7. Pawan Kumar Sharma, Ranbir Singh Rana and Sunil Kumar 2012. dhVµiraxksa o chekfj;ksa ij tyok;q ifjorZu ds laHkkfor izHkkoA In Edited book "tyok;q ifjorZu ,ao ioZrh; [ksrh" by Ranbir Singh Rana, Sharda Singh and Vaibhav Kalia Published By Director ate of Research CSKHPKV, Palampur. page 26-32
8. Naval Chander, Ranbir Singh Rana and Ruchi Sood 2012. cjkuh [ksrh ij tyok;q ifjorZu dk izHkkoA In Edited book "tyok;q ifjorZu ,ao ioZrh; [ksrh" by Ranbir Singh Rana, Sharda Singh and Vaibhav Kalia Published By Director ate of Research CSKHPKV, Palampur. page 33-34
9. Ruchi Sood and Ranbir Singh Rana 2012. tyok;q ifjorZu ,ao lCth mRiknuA In Edited book "tyok;q ifjorZu ,ao ioZrh; [ksrh" by Ranbir Singh Rana, Sharda Singh and Vaibhav Kalia Published By Director ate of Research CSKHPKV, Palampur. page 35-38

10. Ranbir Singh Rana, Naval Chander, Ranu Pthaniya and Vijay shree sen 2012. tyok;q ifjorZu ls fuiVus dk ,d fodYi% tSfod [ksrh A In Edited book "tyok;q ifjorZu ,ao ioZrh; [ksrh" by Ranbir Singh Rana, Sharda Singh and Vaibhav Kalia Published By Director ate of Research CSKHPKV, Palampur. page 39-42
11. Ranbir Singh Rana, Anup Katoch, Naval Chander, Sunil Kumar and Atul Thakur 2012. ekSle iqokZuqeku lEcU/kh ikjEifjd Kku ,ao tyok;q izfrjks/kh vH;klA In Edited book "tyok;q ifjorZu ,ao ioZrh; [ksrh" by Ranbir Singh Rana, Sharda Singh and Vaibhav Kalia Published By Director ate of Research CSKHPKV, Palampur. page 43-47
12. Ranbir Singh Rana, Rajender Prasad, Ruchi Sood and Vasudha Katoch 2012. _rq vlarqyu ds ifj–'; esa e/;e vof/k ekSle iwokZuqeku dh [ksrh esa HkwfedkA In Edited book "tyok;q ifjorZu ,ao ioZrh; [ksrh" by Ranbir Singh Rana, Sharda Singh and Vaibhav Kalia Published By Director ate of Research CSKHPKV, Palampur. page 48-54
13. Ruchi Sood, Ranbir Singh Rana and Aditya Rana 2012. _rq vlarqyu ds ifjn`'; esa nh?kZ vof/k ekSle iwokZuqeku dh [ksrh esa HkwfedkA In Edited book "tyok;q ifjorZu ,ao ioZrh; [ksrh" by Ranbir Singh Rana, Sharda Singh and Vaibhav Kalia Published By Director ate of Research CSKHPKV, Palampur. page 55-58
14. Ruchi Sood and Ranbir Singh Rana 2012. ekSle iwokZuqeku ij vk/kkfjr lCth mRiknu essa ijkeZ'k lsok,aA In Edited book "tyok;q ifjorZu ,ao ioZrh; [ksrh" by Ranbir Singh Rana, Sharda Singh and Vaibhav Kalia Published By Director ate of Research CSKHPKV, Palampur. page 59-62
15. Ranbir Singh Rana and Ranu Pthaniya 2012. lk'kqikyu esa ekSle iwokZuqeku vk/kkfjr —f"k ekSle ijkeZ'k lsokvksa dk egRoA In Edited book "tyok;q ifjorZu ,ao ioZrh; [ksrh" by Ranbir Singh Rana, Sharda Singh and Vaibhav Kalia Published By Director ate of Research CSKHPKV, Palampur. page 63-66
16. Ranbir Singh Rana, Sunil Kumar, Vijay shri sen, Nutan Sharma and Ranu Pthaniya and 2012. Ñf"k chek ;kstuk,a% tyok;q ifjorZu ls vkfFkZd uqdlku dh HkjikÃ dk fodYiA In Edited book "tyok;q ifjorZu ,ao ioZrh; [ksrh" by Ranbir Singh Rana, Sharda Singh and Vaibhav Kalia Published By Director ate of Research CSKHPKV, Palampur. page 67-70
17. Ranbir Singh Rana, Manmohan Singh and Atul thakur 2012. fdlku ekSle iwokZuqeku vk/kkfjr —f"k lykg dgka ls izkIr djsa\ In Edited book "tyok;q ifjorZu ,ao ioZrh; [ksrh" by Ranbir Singh Rana, Sharda Singh and Vaibhav Kalia Published By Director ate of Research CSKHPKV, Palampur. page 71-75
18. Ranbir Singh Rana, Naval Chander, Karan Verma and Sunil Kumar 2012. tyok;q ifjorZu ls lnhZ vkSj ikys }kjk Qlyksa ij gksus okys uqdlku ls dSls cpko djsa\ In Edited book "tyok;q ifjorZu ,ao ioZrh; [ksrh" by Ranbir Singh Rana, Sharda Singh and Vaibhav Kalia Published By Director ate of Research CSKHPKV, Palampur. page 76-84
19. Sharda Singh, Ranbir Singh Rana, Kunal Sood, Arun Kumar, Sunil Kumar and Nutan Sharma 2012. fgekpy izns'k esa cSo th vkÃ ,l ,ao LFkkuh; Hkw lwpuk ra=% fdlkuks dks Ñf"k; lwpuk igqapkus dk ,d izHkko'kkyh fodYiA In Edited book "tyok;q ifjorZu ,ao ioZrh; [ksrh" by Ranbir Singh Rana, Sharda Singh and Vaibhav Kalia Published By Director ate of Research CSKHPKV, Palampur. page 85-102
20. Ranbir Singh Rana and Rajender Prasad 2012. Ñf"k ekSle os/k'kkyk ds midj.k&,d ifjp;A In Edited book "tyok;q ifjorZu ,ao ioZrh; [ksrh" by Ranbir Singh Rana, Sharda Singh and Vaibhav Kalia Published By Director ate of Research CSKHPKV, Palampur. page 103-106

21. Ranbir Singh Rana,Sunil Kumar, Naval Chander and Aditya Rana. tyok;q ifjorZu ds izHkko dks de djus ds fy, fdlku ,ao vke vkneh D;k djsa\ In Edited book "tyok;q ifjorZu ,ao ioZrh; [ksrh" by Ranbir Singh Rana, Sharda Singh and Vaibhav Kalia Published By Director ate of Research CSKHPKV, Palampur. page 107-108

VIII. COMPENDIUM

1. Sharda Singh, Kunal Sood, Arun Kaushal, Vaibhav Kalia, and Ranbir Singh Rana, Compendium of Special Lecture Notes on "Geospatial Technologies and Applications" 21 days Summer Training Programme sponsored by NRDMS(DST, New Delhi) organized w.e.f. 24 June 2012 to 14 July 2012.
2. Sharda Singh, Kunal Sood, Arun Kaushal, Vaibhav Kalia, and Ranbir Singh Rana "GIS based Agriculture Resource Information System" in Compendium of Special Lecture Notes on NRDMS-DST Sponsored 21 days Summer Training Programme on "Geospatial Technologies and Applications" 25th June 2012 to 14th July 2012.
3. Vaibhav Kalia, Ranbir S. Rana and Nutan Sharma. "GIS Data Structures and File Types". Special Lecture Notes on NRDMS-DST Sponsored Summer Training Programme on Geospatial Technologies and Applications 25 June 2012 to 14 July 2012.
4. Ranbir Singh Rana, Vaibhav Kalia, and Sunil Kumar. "Electromagnetic energy and Remote Sensing". Special Lecture Notes on NRDMS-DST Sponsored Summer Training Programme on Geospatial Technologies and Applications 25 June 2012 to 14 July 2012.
5. Vaibhav Kalia, Dr. Ranbir S. Rana and Nutan Sharma. "Topographic Maps". Special Lecture Notes on NRDMS-DST Sponsored Summer Training Programme on Geospatial Technologies and Applications 25 June 2012 to 14 July 2012.
6. Ranbir S. Rana, Vaibhav Kalia, Kunal Sood and Arun Kumar. "Global Positioning System (GPS) and its application". Special Lecture Notes on NRDMS-DST Sponsored Summer Training Programme on Geospatial Technologies and Applications 25 June 2012 to 14 July 2012.
7. Ranbir Singh Rana, Aditya, Ruchi Sood and Kunal Sood. "Role of Remote Sensing and GIS in Agrometeorology". Special Lecture Notes on NRDMS-DST Sponsored Summer Training Programme on Geospatial Technologies and Applications 25 June 2012 to 14 July 2012.
8. Ranbir Singh Rana, Ruchi Sood and Navell Chander. "Crop Growth and Productivity Monitoring and Simulation Using Remote Sensing and GIS". Special Lecture Notes on NRDMS-DST Sponsored Summer Training Programme on Geospatial Technologies and Applications 25 June 2012 to 14 July 2012.
9. Ranbir Singh Rana, Sunil Kumar, Sanjay Kumar and Arun. "Concepts of Radiometric and Geometeric Corrections of Image Data". Special Lecture Notes on NRDMS-DST Sponsored Summer Training Programme on Geospatial Technologies and Applications 25 June 2012 to 14 July 2012.

IX. INFORMATION BROCHURE/ PAMPHLET PREPARED

1. Agro-advisory services Brochure in Hindi

2. Agro-advisory services Brochure in English

3. Booklet on research highlights of Network Project On Climate Change from 2004 to 2012

EXTENSION

A. Extension projects

Sr. No	Title of the Project	PI or Co-PI	Funding source	Budget (Lakhs	Duration
1.	INSPIRE Internship camp	Coordinator Dr. S.S.Kanwar	DST	Rs. 9.38	23.9.2014 to 27.9.2014
2.	INSPIRE Internship camp	-do-	DST	Rs. 8.00	26.12.2014 to 30.12.2014
3.	INSPIRE Internship camp	-do-	DST	Rs. 8.00	27.3.2015 to 31.3.2015

B. Extension Highlights

1. Workshop on Seabuckthorn organized on 14.3.15 at tribal Bhawan, Bhunter. The workshop was chaired by Sh. Ravi Thakur, Hon'ble MLA (L&S) cum The Vice-Chair person, National Commission for Schedules tribes, Govt. of India. It was attended by about 90 farmers, scientists, officers of Forest department etc. of tribal areas of the state.
2.

C. Lectures delivered by the faculty members

Dr. Neelam Sharma, Professor and Head

Sr. No.	Name of Training	Date	No. of Lectures	No of Participants
1	स्प्रे उपकरणो का मापाकन Training for farmers of village Leo,Kinnaur	November 27, 2014.	1	100
2	शाकनाशी अवशेषः समस्याए एव सुधार Training for farmers of village Leo, Kinnaur	November 27, 2014.	1	100
3	स्प्रे उपकरणो का मापाकन Training for farmers of village Nako, Kinnaur	November 28, 2014.	1	100
4	शाकनाशी अवशेषः समस्याए एव सुधार Training for farmers ofvillage Nako, Kinnaur	November28, 2014.	1	100
5	स्प्रे उपकरणो का मापाकन Training for farmers of village Nashing,Kinnaur	November 29, 2014.	1	100
6	शाकनाशी अवशेषः समस्याए एव सुधार Training for farmers of village Nashing,Kinnaur	November 29, 2014.	1	100

7	स्प्रे उपकरणो का मापाकन Training for farmers of village Saperu, Kangra	March3, 2015.	1	50
8	शाकनाशी अवशेषः समस्याए एव सुधार Training for farmers of village Saperu, Kangra	March3, 2015.	1	50
9	स्प्रे उपकरणो का मापाकन Training for farmers of village Jikhali Beth Kangra	March17, 2015.	1	50
10	शाकनाशी अवशेषः समस्याए एव सुधार Training for farmers of of village Jikhali Beth, Kangra	March17, 2015.	1	50
11	स्प्रे उपकरणो का मापाकन Training for farmers of village Gunhar, Kangra	March24, 2015.	1	100

By Dr. S.S. Kanwar, Professor and Head

Sr. No.	Name of training(s)	Period		No. of lectures	No. of participants
1.	INSPIRE Internship camp organized by the Dept. of Microbiology, CSKHPKV, Palampur at Palampur	23.9.2014	27.9.2014	one	160
2.	INSPIRE Internship camp organized by the Dept. of Microbiology, CSKHPKV, Palampur at Palampur	26.12.2014	30.12.2014	one	183
3.	INSPIRE Internship camp organized by the Dept. of Microbiology, CSKHPKV, Palampur at Palampur	27.3.2015	31.3.2015	one	108

D. Other Activities

1. Kisan Mela -2013- Dr. Ranbir Rana worked as Coordinator of the Centre and COBS w.e.f. 20-21 April 2013 at Directorate of Extension Education CSKHPKV, Palampur (Vide letter no SCSTE RSC DISASTER Management /VI1239 dated 24-6-2011)
2. At Doordarshan Kendra Shimla, Dr. Ranbir Rana coordinated in the innovative programme series “Weather forecast and Agro advisory" on 28.5.2013 at 6.30pm to 7.0pm

MISCELLANEOUS ACTIVITIES

A. INCOME GENERATION

Department	Income Generated
Department of Microbiology	Rs.1,11,950/-
Department of Biology & Environmental Sciences	
Department of Physical Sciences and Languages	Rs.15,100/-
Centre for Geoinformatics Research and Training	
Grand Total	

B. PAPER SETTER/EVALUATOR/EXTERNAL EXAMINER

Sr.No.	Faculty Name	Institution Name
1.	Dr. Navneet K Gupta	i. Himachal Pradesh University, Shimla ii. Punjabi University, Patiala iii. University of Rajasthan, Jaipur iv. Dr.Y.S.Parmar University of Horticulture and Forestry, Solan v. Punjab Agricultural University, Ludhiana vi. SKAUST, Jammu vii. CSA University of Agri. & Tech., Kanpur
2.	Dr.(Mrs.) Anita Singh	i. Punjab Agricultural University, Ludhiana ii. CSA University of Agriculture & Technology, Kanpur iii. Dr Y S Parmar University of Horticulture and Forestry, Solan
3.	Dr. R.C. Chauhan	i. Dr.Y.S.Parmar University of Horticulture and Forestry, Solan
4.	Dr.(Mrs.) Usha Rana	i. Dr.Y.S.Parmar University of Horticulture and Forestry, Solan
5.	Dr.Kamlesh Singh	i. Shri Kanshi Ram University of Agri. & Tech., Banda (UP). ii. Dr Y S Parmar University of Horticulture and Forestry, Solan
6	Dr. Manoj Bhargava	i. Sher-e-Kashmir University of Agricultural Sciences and Technology, Jammu.
7	Dr. S.S. Kanwar	i. Punjab Agricultural University, Ludhiana ii. Himachal Pradesh University, Shimla iii. HNB University, Garhwal iv. Dr. Y.S.Parmar University of Horticulture and Forestry, Solan
8	Dr. M. K. Gupta	i. Himachal Pradesh University, Shimla ii. Dr. Y.S.Parmar University of Horticulture and Forestry, Solan

9.	Dr.(Mrs.) Sharda Singh	i.	NIT, Hamirpur.
10.	Sh. Vaibhav Kalia	i. ii.	KLB DAV College for Women, Palampur. GGDSD College, Rajpur
11.	Dr.Ranbir Singh Rana	i. ii.	Dubrugarh Unversity, DIBRUGARH Assam. HAU, Hissar
12.	Sh.Kapil Sharma	i.	Dr. Y.S.Parmar University of Horticulture and Forestry, Solan

C. FACULTY AS REFEREE/REVIEWER FOR SCIENTIFIC JOURNALS

i.	Dr. Navneet K Gupta		• Reviewer for International Journal of Radiation Biology • Reviewer for Indian Journal of Experimental Biology
ii	Dr.(Mrs.) Anita Singh		• Executive Editor of Biosciences and Agriculture Advancement Society • Committee member for preparation of "Hand Book of Agriculture Education" by ICAR, New Delhi
iii.	Dr. S.S. Kanwar		• Member, Editorial Board of Himachal Journal of Research w.e.f. 14-2-2011. • Member, Editorial Board of International Journal of Food & Fermentation Technology. • Reviewer Annals of Applied Biology • Reviewer Bio-technology and Applied Bio-chemistry • Reviewer Proceedings of National Academy of Sciences • Reviewer Journal of Food Science & Technology • Reviewer, African Journal of Biotechnology • Reviewer, Brazilian Journal of Microbiology • Reviewer African journal of Microbiology Research
iv.	Dr.Ranbir Singh Rana		• Journal Referee in the Journal of Agrometeorology for 2012

D. HONOURS/AWARDS

- Dr.Virendra Singh was conferred Golden Jublee Endowment Visiting Fellowship Award" by ICT, Mumbai on 8.3.13

E. OTHER ACTIVITIES

Dr.Virendra Singh

- Conducted a Workshop of NAIP Project on Seabuckthorn, Bhunter for a group of 300 farmers of Lahaul-Spiti on 13.3.13

Dr Manoj Bhargava

- In addition to the departmental duties the Head of the Department has also been assigned the duties of Nodal Officer (Statistics) by the University which is being performed sincerely. The main responsibility of the Nodal Officer is in collecting, compiling the information related to Higher Education from various offices of the University and supplying the same to UGC, New Delhi and other Governmental organizations which is a

continuous process. The major work during the period was to complete the assignments for All India Survey on Higher Education.

- He has been assigned the duties of Nodal Officer (SAS) by the University which is being performed sincerely. The main responsibility of the Nodal Officer is installation, maintenance and upkeep of SAS software at CSKHPKV, Palampur under NAIP research project on "Strengthening Statistical Computing for NARS".
- The data analysis related to the research of ten (10) postgraduate students and scientists was done using statistical software available in the department. Statistical analysis of the data related to some on-going research projects of the University were also carried out.
- Statistical helps were provided to the postgraduate students, research scientists of the University and research scholars of IHBT (CSIR), Palampur in their research problems.
- Is the member of the Sale and Purchase Committee of the College of Basic Sciences during the year 2012-13.
- Has been nominated as a member of University Publication Committee by Hon'ble Vice-Chancellor.
- Was assigned duties by the Dean, COBS for counseling and registration for admission to first year of B.Sc. programme during July, 2013.
- Has been nominated as a Secretary, Science Club, College of Basic Sciences.

Dr Kamlesh Singh

- Is performing the additional duties of the Dean, Postgraduate Studies w.e.f. 01.05.2012.

Dr. S.S. Kanwar

- Member Educational and Resident Instructions Advisory Committee of the University.
- Outside Expert on the Board of Under Graduate Studies in Biotechnology for the term 28.12.2011 to 27.12.2012 of Punjabi University, Patiala.
- Member of Institutional Animal Ethic Committee and attended a meeting in the office of the Chairman-cum-Convener (Dean, COVAS), CSK HPKV, Palampur on 12.11.2.12.
- Attended the Assessment Committee meeting regarding upgradation of Jr. Research Fellows to Sr. Research Fellows at IHBT, Palampur, on 18.4.2013.
- Attended Assessment Committee meeting regarding promotion of Associate Professor to Professor in the chamber of the Vice-Chancellor, CSK HPKV, Palampur on 23.4.13.
- Acted as an Expert in the interview of Union Public Service Commission for the post(s) of Jr. Scientific Officer at Dholpur House, Shahjahan Road, New Delhi on 16th and 17th January, 2013.
- Evaluated bio-data and research publications of Dr. (Mrs.) Neelam for promotion to the post of Professor under CAS, Kurukshetra University, Kurukshetra(Haryana).
- Appointed as Liaison Officer of the University to exercise proper check over the matters relating to reservation in services as applicable from time to time in the University
- Chairman of University Development Committee to finalize the documents pertaining to the University Financial Health Status
- Member, College Purchase Committee, College of Basic Sciences, CSK HPKV, Palampur
- Member, Board of Studies, COBS, CSKHPKV, Palampur
- Performed duties as Head of Department
- Member Merit Scholarship/Stipend during the Academic Year 2012-13 to UG & PG students

Dr. Sharda Singh

- Chaired Technical Session in International seminar in International Seminar on "Crop Management in Changing Climate" 11-13 February, 2013 organised by Department of Agronomy, University of Agriculture, FAISALABAD, Pakistan -38049.

- Nodal Officer for Geoinformatics System and Remote sensing from CSKHPKV-Palampur for Aryabhat Geo-informatics Space Application Centre, Shimla
- Member, Team of Scientists for Climate Change from CSKHPKV-Palampur in the State of Himachal Pradesh
- Member, Intellectual Property Rights Committee (IPRs)
- Member College Purchase Committee, College of Basic Sciences
- Member, Board of Studies, College of Basic Sciences
- Member Screening Committee for hiring teachers
- Chairman, Interview Committees for Research staff in CGRT
- Supporting PG students for their study area and thematic maps for their thesis work
- Accreditation team visit 5th of Oct 12 to 7th of 12.

Dr. Ranbir Singh Rana

- Attended Regional Review Meeting of "FASAL" project at IARI, Delhi during 8-9 Nov. 2012Improvement of yield forecasting by the use of advance statistical methods and crop simulation models.
- Attended Sixth annual review meeting of adhoc Project "Intergraded Agro Met Advisory Services" Project being held on 21-23 November, 2012 BHU, Varanasi
- Attended International Workshop on "Scaling up Climate Services for Farmers in Africa and South Asia", December 10 to 12, 2012 at DAKAR, Senegal under Climate Change: Agriculture and Food Security program (CCAFS)
- Attended International Conference on Crop Management in Changing Climate at University of Agriculture, Faisalabad , Pakistan w.e.f. February 11-13, 2013
- Dr. Ranbir Singh attended the Brainstorming workshop on snow and glaciers and the Himalayan river systems at Shimla on 29-30 May, 2013.
- Attended annual review meeting of FASAL Project at ANGRAU, Hyderabad w.e.f. 18-20 March, 2013 and 2 days exposure meeting on e-agromet under AAS Project on 18-20 March, 2013.
- Appointed as State level member of Advisory group for "Indian Himalayas Climate adaptation Programme (IHCAP) Under Indo – Swiss collaboration Programme in DEST, Shimla by the order of worthy Chief Secretary GOI Himachal Pradesh. (Vide letter no ENV.S&T(F) Indo-Swiss –DST/2012-1987 dated 7th December, 2012
- Appointed as panelist for generation of thematic status paper generation of thematic status paper with reference to climate change on Agriculture (all components of Agriculture, Cereals, Pulses, oilseeds, minor cereals. millets and grasses etc. (Vide letter no. SCCTE/CCC/F (7)-7/10-461 dated 18.4.2013 By Dr. H.K.Gupta, IFS ,Joint Member Secretary, State Centre for Climate Change, State Council for Science, Technology & Environment, HP B-34 SDA Complex,Kasumpti Shimla-171011 HP India.
- Appointed as member of COBS sale, purchase and inspection committee (Vide letter no. QSD./COBS/CSKHPKV/Store/17/11/195-202 dated 7.1.2012-continue
- Magazine Chief Editor: Appointed as Editor (Technical Section) of College of Basic Science magazine (Vigyan Punj) for 2012-13 (Vide letter no QSD-3-10/(Acad) (COBS)-CSKHPKV-5184-95 dated 03-10-2012.
- Appointed As a Committee Member Verification of Permanent & Consumed stocks Deptt of Chemistry and Biochemistry, COBS for 2012-13.
- Appointed As a Committee Member Verification of Permanent & Consumed stocks for CGRT, for the year 2012-13
- Appointed As a Committee Member Verification of Permanent & Consumed stocks for Physical Sciences and Languages for the year 2012-13
- Appointed As a Committee Member for quotation opening committee of deptt Microbiology
- Acted as convener in National Science day for Painting competition held on 25 February, 2012. (Vide letter no.QSD/3-63/ COBS/ Sci day /2013-453-63 dated /4-2-2013

- Acted as convener for Painting competition held on 27 August, 2012 to create awareness for anti Ragging. (Vide letter no.QSD/3-63/ COBS/ Sci day /2013-453-63 dated /4-2-2013
- Member of flying squad for COBS final examination (QSd.3-39 (Acad) COBS/CSKHPKV-2500-2510 dated 22.5.2013
- Member of Technical/Secretarial and Hall arrangement Committee for Annual Group Meeting AICRP-Weed Control w.e.f. April 26-27, 2013 (Vide Letter no. QSd.9-16-DR-CSKHPKV/Tech-2013/-3911-50 dated 11.4.2013
- Election duty as counting supervisor of GOI on 20-12-2012 (vide letter no. 3-SDP (ELN-2) 2/2012 dated 24.11.2012
- Involved as in administrative work as PIs of the Projects
- Involved as Landscape Incharge of COBS (Vide Letter no. QSD2-38/2007 CSKHPKV(COBS-Estt)/-5350-62dated19.9.2012

Sh. Vaibhav Kalia

- Contributed in National Science Day Celebrations in the University
- Member COBS Anti-ragging committee.
- UNS LAN segment Incharge of COBS.
- Member of webpage updating committee constituted by Dean PGS
- Data processing supervisor for Entrance Test 2013 of University admissions - responsible for Post-Exam (OMR Answer sheet) processing.
- Committee for purchase and installation of CCTV cameras and other items in the University library under CDA grant.
- Member of the committee for preparation of RESULT FRAMEWORK DOCUMENT (RFD) of CSKHPKV, constituted by the Hon'ble Vice Chancellor, CSKHPKV, Palampur.
- Appointed as Coordinator for EDUSAT based trainings in the University - conducted one training in the report period.
- Provided assistance for Conducting of Typing Test of the post of Clerks in Computer Lab. COBS on 17-02-2013.
- RKVY Data Entry on RKVY MIS National Portal (http://rkvymis.dacnet.nic.in/)
- Webmanager COBS website.
- NKN Security Officer for University Internet.
- NISAGNET (COBS) nodal officer.
- Game Incharge COBS - Volleyball.
- Editor, Technical Section of COBS Magazine.
- Student Counselor, COBS
- Performed Invigilation duty in the ICAR's 18th All India Entrance Examination for Admission to UG degree programme (AIEEA 2013-UG)
- Appointed as Subject Expert in the Selection committee appointed for the recruitment to the posts of Project Fellow at Institute of Himalayan Bio-resource Technology (CSIR) Palampur on 10-04-2013.
- Performed ELECTION DUTY in Compilation Section of 14-Sullah constituency at Palampur on 20-12-2013

Sh. Kapil Sharma

- Appointed as Editor (Technical Section) of College of Basic Science magazine “Vigyan Punj” for 2012-13
- Treasurer, Science Club, College of Basic Science
- Member, College Canteen Management Committee
- Assisted the Dean, COBS for counseling and registration for admission to first year of B.Sc. programme during July, 2013.
- Assisted in Preparation of Time Table.

- Member of Anti-Ragging Committee, CoBS
- Appointed as member of COBS sale, purchase and inspection committee.
- Appointed as a Committee Member Verification of Permanent & Consumed stocks for Department of Biology and Environmental Sciences.
- Appointed as a Committee Member Verification of Permanent & Consumed stocks for Department of Physical Sciences and Languages.
- Game Incharge, Badminton, COBS.

F. NATIONAL SCIENCE DAY CELEBRATIONS

The National Science Day was celebrated in the College from February 26-28, 2013. The faculty and students participated in various activities organized on this occasion whole heartedly.

G. NATIONAL SERVICE SCHEME

Dr. K.P. Singh, Professor shared the responsibility of NSS Programme Officer, COBS Unit. During the period under report.

1. A Special seven day camp of NSS was organized at village Rajpur from 29.12.2012 to 04.01.2013 in which 61 NSS volunteers participated. The emphasis of the camp was on 150th Birth Anniversary of Swami Vivekananda with the theme "Wake up Bharat ! Enlighten the World !! ", environment protection, uprooting of Parthenium hysterophorus (Gaajar Ghaas) from public parks, HIV/AIDs awareness, health awareness and literacy etc. A rally was undertaken by NSS volunteers for conveying the teaching and messages of Swami Vivekananda on 03.01.2013. Parthenium Weed Awareness campaign including a rally was organized at school and village to create awareness among youth about this abnoxious weed.
3. The under mentioned days were celebrated by NSS volunteers with faculty and staff of the College of Basic Sciences during the year 2012-13:
    - A pledge taking ceremony on Sadbhavna Diwas on 17th August, 2012 was held in the College,
    - Hindi Diwas was celebrated on 14th September, 2012.
    - International Peace Day was celebrated on 21st September, 2012.
    - NSS Day was celebrated on 24th September, 2012.
    - Communal Harmony Campaign Week including Flag Day was celebrated from 19th to 25th, November, 2012.
    - World AIDS Day on 01-12-2012.
    - National Youth Week was celebrated during 12-19th January, 2013.
    - International Women Day on 8th March, 2013.
    - University Blood Donation camp on 19th February, 2013.

H. LIAISON/ COLLABORATION WITH NATIONAL/ INTERNATIONAL BODIES

Department of Microbiology:

- Collaborated with Regional Research Station of IVRI, Palampur for framing an adhoc project submitted to DST, GOI, New Delhi for funding.

- Collaborated with Panjab University Chandigarh for framing one adhoc project submitted to CSIR, New Delhi.

- Collaborated with NDRI, Karnal for framing an adhoc project submitted to DST, GOI, New Delhi for funding.

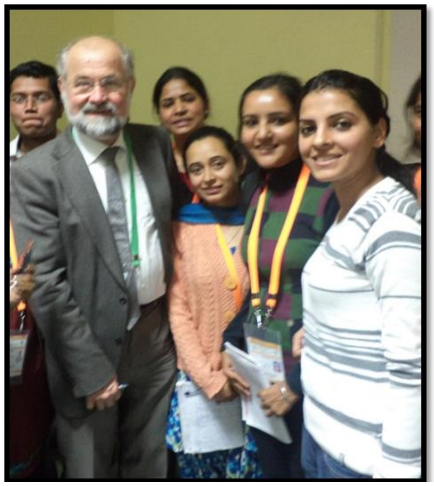
I. NAME OF VIP VISITORS

Sr. No.	Date	Name & Address
1	13/8/12	Sh. Keaneth Gousalves, IIT Mandi
2	17/8/12	Sh. Subroto Talukdar, JICA India
3	15/10/12	Dr. J.H. Kulkarni, Former V.C., University of Agriculture Sciences, Dharwal, Karnataka.
4	19/10/12	Dr. Arvinder Singh, IAS (Election Observer) Secretary, State Information Commissioner Punjab, Chandigarh.
5	11/12/12	Dr. (Mrs.) S.K. Mann, Former Dean, M.Sc. PAU, Ludhiana.
6	10/2/13	Sh. Sujan Singh Pathania, Hon'ble Minister for Agriculture, Govt of Himachal Pradesh

Glimpses

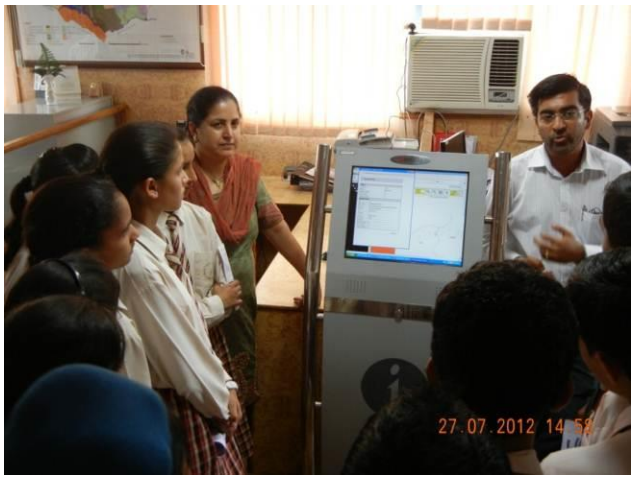
Visit of Sh. S.S.Pathania, Hon'ble Agriculture Minister, Govt. of H.P.

Visit of Dr. D.S. Rathore, Former Vice-Chancellor, CSKHPKV, Palampur



PG students of College of Basic Sciences with Dr. Erwin Neher (An American Scientist and Nobel Prize winner) during 5th Science Conclave held at IIIT Allahabad w.e.f. 8.12.12to 14.12.12.

Dr S.K. Dhiman, Vice Chancellor of H.P. Technical University inaugurating one of the INSPIRE Internship Camps.

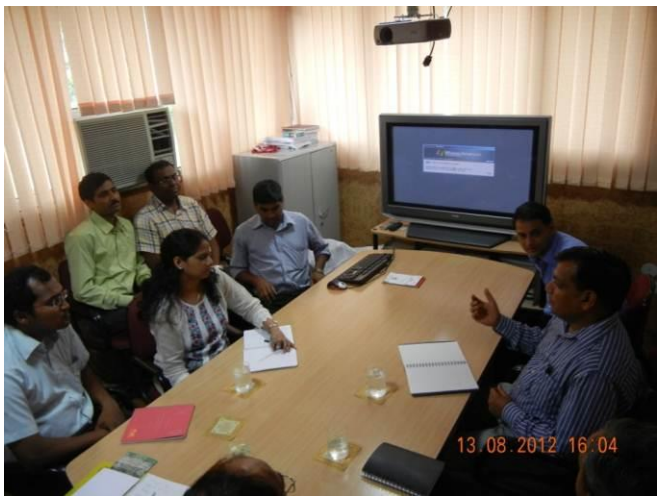


Visit of Students to Centre for Geoinformatics Research and Training, COBS, under INSPIRE programme

Dr.K.K.Katoch, Director, Extension Education Lighing up the lamp before cultural programme on National Science Day-2013

Entries from School Children for on the Spot Painting Competition organized on National Science Day-2013

N.S.S. volunteers during the camp organized in Village Rajpur



Scientists from IIT, Mandi discussing scope for collaboration with CGRT