

Centre of Advanced Faculty Training Progress and Impact during XI plan (2007-2008 to 2011-2012)

1. **Name of the CAFT/Department/ Division** : Division of Biochemistry, IARI,
New Delhi-110012

2. **Brief introduction about the Division:**

A separate Division of Biochemistry was created in 1966 with major emphasis on Molecular Biology, Plant Biochemistry and nutrition.

Some of the major achievements of the Division in the past are:-

- development of low toxin somaclones of *Lathyrus sativus*.
- extensive studies in protein and starch biosynthesis in major cereals leading to identification of constraints limiting the yield.
- isolation and characterization of major genes involved in the fatty acid and triacyl glycerol synthesis in *B.juncea*.
- isolation and characterization of microsomal seed specific (*fad 2-1*) encoding oleate desaturase soybean and introduced into Arabidopsis .
- isolation and characterization of antiviral proteins and their corresponding gene from non-host plant etc.
- isolation and characterization of genes involved in phytic acid biosynthesis (MIPS) & degradation (phytase) from soybean has been carried and efforts are on to develop transgenic soybean with low phytate.
- transcription factor encoding gene sequence associated with water-deficit stress has been isolated and characterized. Attempts have been made to clone these in binary vector for transformation of rice and Arabidopsis.
- kinetic studies of biooxygenase isozymes and their role in off-flavour development in soybean has been carried out. The ratio of linoleic to linolenic acid has been found to be useful as a criteria for selection of soybean seeds for decreased off-flavour development.
- lower dose of gamma irradiations (0.5 kGy) of soybean seeds leads to enhancement in the antioxidant potential and the enhancement is maximum in yellow seed coat coloured genotypes.

- Different gene of HSP (HSP 90, HSP 70, HSP 26, HSP 17) were isolated and characterized from C306 of wheat.
- Western blot analysis of HSP90 shows the formation of multiple co-chaperons against heat shock.

3. **Objective of CAFT:**

Division was recognized as the Centre of Advanced Studies by ICAR in 1995. The Centre has played important role in human resource development by conducting short-term training courses under the auspices of Centre of Advanced Faculty in which over 375 scientists/faculty from various Institutes and Universities under NAARS have been trained in various aspects of Biochemistry and Molecular.

4. **Faculty: Name & Designation (as on 30.09.2011):**

1. Dr. R.D. Rai, Principal Scientist & Head
2. Dr. (Mrs.) I.M. Santha, Principal Scientist & Professor
3. Dr. (Mrs.) Archana Sachdev, Principal Scientist
4. Dr. (Mrs.) Aruna Tyagi, Principal Scientist
5. Dr. Shelly Praveen, Senior Scientist
6. Dr. Anil Dahuja, Senior Scientist
7. Dr. Archana Singh, Senior Scientist
8. Dr. Dharam Paul Chaudhary, Senior Scientist
9. Dr. Ranjeet Ranjan Kumar, Scientist
10. Dr. Bharat Bhushan, Scientist
11. Dr. Suneha Goswami

5. **Human Resource Development :**

(particulars of short courses/training program for HRD conducted during XI plan period)

S.No.	Name of the program	Period	No. of participants		
			Internal	External	Total
1.	Advanced biochemical & molecular biology techniques	18 th Sep – 8 th Oct, 2007 (21 days)	1	10	11

2.	Basic techniques in plant molecular biology	19 th Feb – 10 th March, 2008 (21 days)	2	10	12
3.	Recombinant DNA techniques	16 th Aug – 5 th Sep., 2008 (21 days)	1	13	14
4.	Biochemical and molecular biology advanced techniques	18 th Nov – 8 th Dec., 2008 (21 days)	2	13	15
4.	Advanced techniques in plant biochemistry and molecular biology	18 th Feb – 10 th March, 2011 (21 days)	2	18	20

6. **Infrastructure development (equipment etc.):**
1. New CAFT training lab.
 2. Renovation of PG lab.
 3. Modernization of class room with interactive board and projection facilities.
 4. Auditorium renovated, new AV facilities.
 5. Real Time PCR, Gel doc, GLC, Ice-flaking machine.
7. **Renovation of Lecture Room/laboratories :** Lecture room and all laboratories fully renovated with institute funds.
8. **Library upgraded :**
1. Library has been renovated with flooring, false-ceiling, AC etc.
 2. 39 new books were added.

9. **Awards/Recognition** :

- Dr. Prikshayat Singh : Nominated under INSA collaborative/Exchange programme to visit Germany.
- Dr. I.M. Santha : Nominated as Fellow of Indian Society of Agricultural Biochemists.
- Dr. Aruna Tyagi : Awarded Ful Bright (FNELP) Fellowship to work at Ohio State University, USA for four months.
- Dr. R.R. Kumar : Young Scientist Award in the conference held at Meerut.

10. **Publication*** :

- International journal : 13 (list given below)
- Indian Journal : 18 (list given below)
- Books : Nil
- Manuals : i) Five laboratory manuals were prepared for each of the training programme.
ii) Compendium of lecture notes of the training.
- Any other : Nil

12. **Financial statement** :
(Expenditure under CAFT during XI Plan)

Head	2007-2008	2008-2009	2009-2010	2010-2011	2011-2012
Operating cost of training	1,38,245/-	1,36,200/-	-	2,08,025/-	
Recurring Contingency	1,76,543/-	1,44,277/-	-	1,99,896/-	
Non-Recurring Contingency and TA	31,945	2,76,189/-	-	54,910/-	
Library	45,721/-	42,654/-	-	27,000/-	

Selected publications:

Parameswari, B., Mangrauthia, S.K., Praveen, S. and Jain, R.K., 2007. Complete genome sequence of an isolate of *Papaya ringspot virus* from India. *Arch. Virol.* **152**: 843-845

Kishore, K., Sinha, S.K., Kumar, R., Gupta, N.C., Dubey, N. and Sachdev, A. , 2007. Isolation and characterization of microsomal w-6 desaturase gene (*fad2-1*) from soybean. *Ind. J. Exp. Biol.* **45**: 390-397

Kumar, R., Sinha S.K., Kishore, K., Gupta, N.K., Dubey, N. and Sachdev, A., 2007. Isolation and characterization of *fad2-1* cDNA sequence from *Glycine max L.* *Ind. J. Plant Physiol.* **12**: 6-12

Praveen, S., Ramesh, S.V., Mishra, A.K., Koundal, V. and Jain, R.K. , 2007. Small RNA mediated silencing to target *Tomato Leaf Curl Virus*. *J. Plant Interactions.* **2**(4) 213

Praveen, S. and Ramesh, S.V., 2007. Small RNAs and Viral Interference. *CAB Reviews: Perspectives in Agriculture, Veterinary Science, Nutrition and Natural Resources* 2, No. 043 doi: 10. 1079/PAVSNNR20072043

Ramesh, ,S.V., Mishra, A.K. and Praveen, S., 2007. Hairpin RNA-Mediated Strategies for Silencing of *Tomato leaf curl virus* AC1 and AC4 Genes for effective resistance in plants. *Oligonucleotide.* **17**: 251-257.

Yadav, S., Viswanathan, C. and Tyagi, A. , 2007. Cloning and chracterization of shine clade of AP2 domain transcription factor from *Oryza sativa*.*International J. Tropl. Agricul.* **25**(3): 449-458.

Yadav, S., Hussain, Z., Yadav, S.K., Mishra, S.K., and Tyagi, A., 2007. An over view of AP2/ERF transcription factors and their role in abiotic stress. *International J. Tropl. Agricul.* **25**(3): 407-417.

Ilaiyaraja, N., Rajarani, A.P. and Santha, I.M., 2008. Cloning and Characterization of diacyl glycerol acyl transferase cDNA sequence from *Brassica juncea cv Pusa Bold*. *Indian J. Biochem. Biophys.* **45**: 30-36

Jinu Jacob and I.M Santha, 2008. Isolation and characterization of β – Ketoacyl acyl carrier protein synthase III (KAS III) gene sequence from *Brassica juncea*. *Pusa Agri. Sci.* **30**,17-24

Kumar Rajesh, Dubey Nirupama and Sachdev, Archana, 2008. Isolation an characterization of microsomal-6 desaturase gene from *Glycine max L. cv. Pusa-9702*. *New Botanist-Int. J. Plant Sci. Res.* **35**:1-4, ISSN: 0377-1741

Mangrauthia, S.K., Parameswari, B, Jain, R.K. and Praveen Shelly, 2008. Role of genetic recombination in the molecular architecture of Papaya ringspot virus. *Biochemical Genetics.* **46**(11) 835-846,

- Mangrauthia, S.K., Jain, R.K. and Praveen, Shelly, 2008. Sequence Motifs comparisons establish a functional portrait of a multi-functional protein HC- Pro from Papaya ringspot Potyvirus. *J. Plant Biochemistry & Biotechnology*. 17(2) 201-204
- Mangrauthia, S.K., Praveen, S., Singh, P. and Mishra, A.K., 2008. Behavior of RNAi suppressor protein 2b of *Cucumber mosaic virus* in planta in presence and absence of virus. *Virus Genes*. 37: 96-102
- Mangrauthia, S.K., Choudhary, N.L. and Tyagi, A., 2008. Cloning and characterization of drought responsive partial gene sequence(s) from *Oryza sativa* L. subs p. Indica. *Indian J. Biochem. Biophys.* 45, 387-392
- Sinha, S.K., Dubey, Nirupama and Sachdev, Archana, 2008. Intron-spliced gene silencing constructs for alteration of seed fatty acid composition by RNAi induced transgene silencing. *New Botanist-International J. Plant Sci. Res.* 35: 1-4, 23-32
- Suresha, G.S and Santha, I.M., 2008. Molecular cloning of partial oleate desaturase gene from *Brassica napus* *Indian J. Plant Physiol.* 13: 334-338
- Gupta, N.C., Sinha S.K., Jolly, Monica, Dubey Nirupama and Sachdev, Archana, 2009. Antisense RNA-mediated inhibition of *Gmfad2-1* encoding omega 6 desaturase. *Ind. J. Plant Physiology*. 14(4): 336-343
- Kumar, R.R and Santha, I.M., 2009. Isolation and chracterization of plastidial localized, seed expressive lysophosphatidyl acyl transferase (*LPAAT*) from *Brassica juncea* *J. Plant Biochem. and Biotechnol.* 18: 225-228
- Kumar, R.R and Santha, I.M, 2009. Isolation and chracterization of intron-less ER localized 1-acyl glycerol-3-phosphate acyl transferase (*LPAAT*) from *Brassica juncea* L. var Pusa Bold. *Pusa Agri. Sci.* 32: 26-32
- Kumari Vinita, Ali, K. and Tyagi Aruna, 2009. Isolation of differentially regulated partial cDNA with respect to water deficit stress from rice. *Indian Journal of Plant Physiology*. 14 306-309
- Mangrauthia, S.K., Parameshwari, B, Praveen, Shelly and Jain, R.K., 2009. Comparative genomics of *Papaya ringspot virus* pathotypes P and W from India. *Archives of virology*. 154: 727-730
- Mangrauthia, S.K., Singh, Viplendra P, Jain, R.K. and Praveen, Shelly, 2009. Ambient Temperature Perception in papaya for *Papaya ringspot virus* interaction *Virus Genes*. 38: 429-434
- Mangrauthia, S.K., Singh, Priyanka and Praveen, Shelly, 2010. Genomics of Helper Component Proteinase Reveals Effective Strategy for Papaya Ringspot Virus Resistance. *Molecular Biotechnology*. 44(1): 22

Ali K., Gujjar R.S., Ram Niwas, Gopal M., Tyagi A., 2011. A rapid method for estimation of abscisic acid and characterization of ABA regulated gene in response to water deficit stress from rice. *American J. Plant Physiol.* 63: 144-156

Somnath Mandal, Pramila Bose, Sangeeta Dawan, A.P. Rajarani, I.M. Santha 2011. Kinetic and expression profiling of cytosolic pyruvate kinase enzyme during seed development of Indian Mustard (*Brassica juncea*). *J. Plant Biochem. Biotech.* 20: 102-109

Chaudhary Vinita, Sachdev Archana 2010. Molecular characterization of phytase gene and phytate accumulation pattern in developing seeds of *Glycine max*. In *CCEA, 2010* Conference proceedings indexed by Thomson, ISI.

Awadhesh Kumar, Sweta Kumari, Monica Jolly and Archana Sachdev 2011. Molecular characterization and expression of MIPS gene in developing seeds of *Glycine max*. Presented at Xth Agricultural Science Congress held at Lucknow on Feb 10-12, 2011

Suneha Goswami, Nandita Sahana, Vanita Pandey, Paula Doblaz, R. K. Jain, Peter Palukaitis, Tomas Canto, Shelly Praveen 2011. Interference in plant defense and development by non-structural protein NSs of groundnut bud necrosis virus. (Accepted) *Virus Research*.

Om Prakash Gupta, Vipin Permar, Vikas Koundal, Uday Dhari Singh, Shelly Praveen, 2011. MicroRNA regulated defense responses in *Triticum aestivum* L. during *Puccinia graminis* f.sp.tritici infection. (Accepted) *Molecular Biology Reports*

Vikas Koundal, Vinutha T, Qazi Mohd Rizwanul Haq and Shelly Praveen¹, 2010. Modulation of Plant Development and MYB Down Regulation: Both during In Planta Expression of miR159a and in Natural ToLCV Infection. *J. Plant Biochemistry & Biotechnology.* 19(2): 171-175