



CENTRE OF ADVANCED FACULTY TRAINING
Division of Biochemistry,
ICAR-Indian Agricultural Research Institute
New Delhi-110012



Introduction

Recognizing the importance of biochemical studies in crop research, the Division of Biochemistry was created in 1966 as a separate Division, with major emphasis on Nutrition, Plant Metabolism and Molecular biology. Since its inception, the Division has acquired the best research, teaching and training facilities and takes legitimate pride in being recognized by ICAR as the only Centre of Advanced Faculty Training (CAFT) in Biochemistry in NARES system ever since 1995. Undoubtedly, dynamic leadership and vision of the Heads of the Division over the years has contributed immensely in bringing the division into the shape it is in now.

The Division has been playing an important role in human resource development under the auspices of the Centre of Advanced Faculty Training, which has been functioning in the Division with following Objectives:

- To bring excellence in Post-Graduation education in Plant Biochemistry
- To organize training programs for improving competence of faculty from NARES in new and emerging areas of Biochemistry
- To provide leadership at the national level in course-curriculum design, and development of instructional material.

Till now, ~500 Scientists/Faculty from ICAR Institutes and SAUs have been trained in 35 training programmes organized so far at our centre.

Currently, there are 12 regular Faculty members/Scientists, as listed below, at various levels [07 Principal Scientists, 02 Senior Scientists and 03 Scientist (Sr. scale)] actively involved in the research, teaching, training and extension activities of the institute. However, whenever CAFT programs are conducted in the division, services of the guest faculty members from other related disciplines of ICAR-IARI are being utilized for delivering lectures and conducting practicals. In addition, the experts in different areas related to the training program are also invited from other ICAR institutes as well as other organizations for providing optimal benefit to the trainees. The training programmes conducted at our centre are always a perfect mix of theory lectures and practicals and we try our level best to provide hands-on training to the participants of the training programme so that they feel confident to design and execute their experiments on their own after the completion of the training programme.

List of Faculty Members/Scientists as on January 2020:

1.	Dr. Shelly praveen	Head & Principal Scientist
2.	Dr. Anil Dahuja	Professor & Principal Scientist
3.	Dr. Archana Sachdev	Principal Scientist
4.	Dr. Aruna Tyagi	Principal Scientist
5.	Dr. Suresh Kumar	Principal Scientist
6.	Dr. Sneh Narwal	Principal Scientist
7.	Dr. Archana Singh	Principal Scientist
8.	Dr. Ranjeet Ranjan Kumar	Senior Scientist
9.	Dr. Suneha Goswami	Senior Scientist
10.	Dr. Vinutha T.	Scientist(Sr. Scale)
11.	Dr. Veda Krishnan	Scientist(Sr. Scale)
12.	Dr. Sweta Kumari	Scientist (Sr. Scale)

Also, there are some mega research facilities created at ICAR-IARI such as “**National Phytotron Facility**” and “**Nanaji Deshmukh Plant Phenomics Centre**”. In all the CAFT programmes conducted at the centre, the visit of the trainees to these prized-possessions of ICAR-IARI is ensured and participants are exposed to new opportunities generated through these facilities. In addition, we are proud of having **Prof. M.S. Swaminathan National Agricultural Science Library** at ICAR-IARI, which has rich repository of books and journals in the field of agriculture and allied sciences. The trainees are given free access to the library during their stay at ICAR-IARI to enrich their knowledge. Furthermore, a **National Agricultural Bioinformatics Grid (NABG)** has been established at our sister institute viz. IASRI, New Delhi. In this grid, the first supercomputing hub for Indian Agriculture i.e. **Advanced Supercomputing Hub for OMICS Knowledge in Agriculture – ASHOKA** has been set up. This facility is built in a state-of-the-art Data Centre and out of nine super-computers of this grid, two super-computers are ranked at 11th and 24th in the list of top super-computers of India by Indian Institute of Sciences, Bangalore. It is always made sure that the trainees of our CAFT program are exposed to this state-of-the-art facility so that they can make use of this facility in their future research programmes. Furthermore, the trainees are always apprised about various strategies/tools/Do’s and Don’ts about writing a

winnable research proposal to get financial support from various funding agencies and to develop international linkages. One of the flagship activities of our training programmes is that participants are asked to formulate a research project based upon the knowledge they have acquired during the training programme followed by the presentations of these projects in front of an expert committee in order to provide them the requisite confidence and competency. The knowledge of the participants is also enriched by conducting various quizzes and debates during the training programmes. One another unique feature of our training programmes is that a test is conducted before the start and after the completion of the training program in order to study the real quantitative impact of the training programs. Besides, a group of the participants of each training program and Faculty members of the division is generated on Whatsapp or E-mail and participants of the training programme are encouraged to be in contact with each other as well as with our faculty to promote networking and to foster collaborations and inter-institutional linkages.

The Course Evaluators appointed by the ICAR always appreciated our efforts during the evaluation process. We arranged not only the interaction of the Course Evaluator with the trainees but organized their lectures as well in their area of expertise so that participants could get insights in diverse areas.

**ACHIEVEMENTS OF THE CAFT IN BIOCHEMISTRY DURING THE
ACTION PLAN 2017-2020**

A. Training programs organized

Year	Topic of the training programme	No of trainees		
		External	Internal	Total
2016-17	Advanced Omics-techniques and tools for crop improvement (March 08 th - 28 th , 2017)	18	01	19
2017-18	Recent Techniques and tools for nutritional quality assessment and enhancement of food crops(January 23 rd - February 12 th , 2018)	18	Nil	18
2018-19	Biochemistry of food crops-from omics studies to nutrient analysis (September 25 th - October 15 th , 2018)	13	01	14
2019-20	Omics meets plant biochemistry-applications in nutritional enhancement with one health perspective (September 7 th - 27 th , 2019)	14	02	16

B. Workshops/Panel Discussion organized during CAFT trainings

During the two CAFT programmes in the period under report, we organized following activities which were not only appreciated by the trainees but by the Course Evaluators as well:

- Workshop on, “Sustainable Nutritional Security: unlocking the hidden potential of crop plants through technological interventions” (February 02, 2018).
- Panel Discussion on, “Food and Nutritional Security-challenges and threats in the new Millennium” (October 12, 2018).

C. Infrastructure Development

- Establishment of the Nutrient Analysis Lab. in the Division and Installation of Ultra Performance Liquid Chromatography (UPLC) system with PDA and RID detectors in it.
- Renovation of the Auditorium and PG lab.
- Enrichment of the library with new books.
- Establishment of Video Conferencing system in the committee room for arranging lectures through skype etc.

D. Financial Statement

S. No.	Budget head	Amount Utilized (in Rs.)		
		2017-18	2018-19	2019-20
1.	Training Component	5,45,437/-	3,74,083/-	5,07,919/-
2.	TA & DA	Nil	Nil	Nil
3.	Recurring Contingency	3,92,487/-	4,05,334/-	3,79,943/-
4.	Books	30,864/-	Nil	34,251/-
5.	Minor Repair Work	Nil	1,94,620/-	Nil
6.	Equipments	Nil	3,56,345	Nil
TOTAL		9, 68,788/-	13,30,382/-	9,22,113/-

E. Awards honors conferred on faculty members

S. No.	Name of faculty member	Name of the award	Year for which given	Agency
1.	Dr. Archana Sachdev	Bharat Ratna Dr. C. Subramaniam Award	2018	ICAR
2.	Dr. Shelly Praveen	Bharat Ratna Dr. C. Subramaniam Award	2019	ICAR
3.	Dr. Shelly Praveen	IARI - Hari Krishna Shastri Memorial Award	2019	ICAR-IARI
4.	Dr. Shelly Praveen	ICAR-Agrivision; ‘Best Scientist Award’	2019	ICAR
5.	Dr. Suresh kumar	Prof. Sushil Kumar Mukherjee	2019	Indian Science Congress Association, Kolkata,

		Commemoration Lecture Award		
6.	Dr. Ranjeet R Kumar	NASI-Associateship	2019	National Academy of Sciences, India (NASI)
7.	Dr. Archana Singh	Second Prize in ICAR's Inter-Institutional vad- vivad Pratiyogita	2019	ICAR
8.	Dr. Vinutha T.	"Young Scientist Award- 2019", Awarded in Biotic Science Congress (BioSCon) held at Salem, Tamil Nadu 26-27, July 2019.	2019	Society for Biotic and Environmental Research (SBER),
9.	Dr. Veda Krishnan	Fulbright Nehru Post- Doctoral Fellowship for 2020-2021	2019	United States-India Educational Foundation (USIEF)
10.	Dr. Veda Krishnan	" Best Oral talk " at "National Conference on Integrative Plant Biochemistry and Biotechnology" held on 8-9 th , Nov 2019.	2019	Society for Plant Biochemistry and Biotechnology (SPBB)
11.	Dr. Shelly Praveen	Vasvik award for 'Agriculture Science and Technology'	2018	Vividhlaxi Audyogik Samshodhan Vikas Kendra, Mumbai
12.	Dr. Shelly Praveen	Panjabrao Deshmukh Women Scientist Award	2017	ICAR, New Delhi
13.	Dr. Ranjeet R Kumar	RH Dastur Award	2018	Indian Society of Plant Physiology
14.	Dr. Ranjeet R Kumar	NASI-Associateship	2018	National Academy of Sciences, India (NASI)
15.	Dr. Suneha Goswami	Young Biochemist Award	2018	International Conference on Agriculture, Allied & Applied Sciences (ICAAAS-2018) organized by BRICPL
16.	Dr. Veda Krishnan	Young Scientist Award	2018	Indian Society for Plant Physiology (ISPP)

17.	Dr. Veda Krishnan	Best Poster Award	October 5-8, 2018	4 th India International Science Festival-2018, IGP, Lucknow, organized by DBT, India.
18.	Dr. Veda Krishnan	Travel grant for presenting at International Rice Congress, Singapore	October 15-17, 2018	5 th International Rice Congress, Singapore
19.	Dr. Anil Dahuja	Selected as an Executive Member of Society of Plant Biochemistry & Biotechnology (SPBB)	2018	Society of Plant Biochemistry & Biotechnology (SPBB), India
20.	Dr. Anil Dahuja	Selected as Editor, Journal for Plant Biochemistry and Biotechnology (JPBB)	2018	Society of Plant Biochemistry & Biotechnology (SPBB), India
21.	Dr. Archana Singh	Second prize in an Institutional Hindi Vad-vivad Pratiyogita during Hindi Chetna Maas in IARI, New Delhi.	2018	ICAR-IARI
22.	Dr. Archana Singh	Selected as an Executive Member of Society of Plant Biochemistry & Biotechnology (SPBB)	2018	Society of Plant Biochemistry & Biotechnology (SPBB), India
23.	Dr. Archana Singh	Selected as an Executive Member of Indian Society of Agricultural Biochemists (ISAB).	2018	Indian Society of Agricultural Biochemists (ISAB), India
24.	Dr. Aruna Tyagi	Selected as Treasurer, Society of Plant Biochemistry & Biotechnology (SPBB)	2018	Society of Plant Biochemistry & Biotechnology (SPBB), India
25.	Dr. Vinutha T	Young Faculty Award	2017	Academic Brilliance Award under EET-CRS

F. Publications

S. No.	Details of Publication	NAAS rating 2019
2018-19		
1.	Krishnan V, Gothwal S, Dahuja A, Vinutha T, Singh B, Jolly M., Praveen S., Sachdev A. (2018), "Enhanced nutraceutical potential of gamma irradiated black soybean extracts. <i>Food Chem.</i> 245 (15): 246-253	10.97
2.	Kumar, R. R., Tasleem, M., Jain, M., Ahuja, S., Goswami, S., Bakshi, S., Jambhulkar, S., Singh, S.D., Singh, G.P., Pathak, H., Viswanathan, C., Praveen, S. (2019). Nitric oxide triggered defense network in wheat: Augmenting tolerance and grain-quality related traits under heat-induced oxidative damage. <i>Env. Exp. Bot.</i> 158: 189-204.	10.37
3.	Kumar S, Chinnusamy V, Mohapatra T. (2018). Epigenetics of modified DNA bases: 5-methylcytosine and beyond. <i>Front. Genet.</i> 9:640. doi:10.3389/fgene.2018.00640.	10.15
4.	Kumar A, Gupta V, Krishnan ., Hada A, Marathe A, Jolly M, Sachdev A. (2019) Seed targeted RNAi-mediated silencing of GmMIPS1 limits phytate accumulation and improves mineral availability in soybean. <i>Sci. Rep.</i> 9:7744 https://doi.org/10.1038/s41598-019-44255-7	10.12
5.	Kumar, R. R., Hasija, S., Goswami, S., Tasleem, M., Sakhare, A., Kumar, S., Bakshi, S., Jambhulkar, S., Rai, G.K., Singh, B., Singh, G.P., Pathak, H., Viswanathan, C., Praveen S. (2019). Gamma irradiation protects the developing wheat endosperm from oxidative damage by balancing the trade-off between the defence network and grains quality. <i>Ecotoxicol. Environ. Saf.</i> 174: 637-648.	9.97
6.	Punjabi M, Bharadvaja N, Jolly M, Dahuja A, Sachdev A. (2018). Development and evaluation of low phytic acid soybean by siRNA triggered seed specific silencing of inositol polyphosphate 6-/3-/5-kinase gene. <i>Front. Plant Sci.</i> 9: 804 doi: 10.3389/fpls.2018.00804	9.68
7.	Kumar RR, Khushboo Singh, Sumedha Ahuja, Mohd. Tasleem1 & Indra Singh, Sanjeev Kumar, Monendra Grover, Dwijesh Mishra, Gyanendra K. Rai, Suneha Goswami, Gyanendra P. Singh, Viswanathan Chinnusamy, Anil Rai, Shelly Praveen (2019) Quantitative proteomic analysis reveals novel stress-associated active proteins (SAAPs) and pathways involved in modulating tolerance of wheat under terminal heat. <i>Funct Integr Genomics</i> 19(2):329-348.	9.50
8.	Li Y, Suresh Kumar and Weiqiang Qian (2018) Regulation of plant development by active DNA demethylation. <i>Plant Cell Rep.</i> 37: 77-85.	8.99

9.	Kumar S.M.S., Mawlong I., Kishwar A and Tyagi A. (2018) Regulation of phytylsterol biosynthetic pathway during drought stress in rice, <i>Plant Physiol. Biochem.</i> 129:11-20.	8.72
10.	Gupta OP, Dahuja A, Sachdev A, Jain PK, Kumari S, Vinutha T, Praveen S, (2019) Cytosine methylation of isoflavone synthase (IFS) gene in the genic region positively regulates its expression and isoflavone biosynthesis in soybean seeds. <i>DNA Cell Biol.</i> 38(6): 1-11.	8.63
11.	Kumar RR, Suneha Goswami, Khushboo Singh, Kavita Dubey, Gyanendra K. Rai, Bhupinder Singh, Shivdhar Singh, Monendra Grover, Dwijesh Mishra, Sanjeev Kumar, Suman Bakshi, Anil Rai, Himanshu Pathak, Viswanathan Chinnusamy, Shelly Praveen (2018) Characterization of Novel Heat-Responsive Transcription Factor (TaHSFA6e) Gene Involved in Regulation of Heat Shock Proteins (HSPs) - A Key Member of Heat Stress-Tolerance Network of Wheat. <i>J. Biotechnol.</i> 279:1-12.	8.60
12.	Vinutha T., Gaurav Kumar, Varsha Garg, Tomas Canto, Peter Palukaitis, S.V. Ramesh, Shelly Praveen (2018) Tomato geminivirus encoded RNAi suppressor protein, AC4 interacts with host AGO4 and precludes viral DNA methylation. <i>Gene</i> 678:184-195.	8.50
13.	Awana M, Vijay Kapale, Mahesh K. Samota, O.P. Yadav, Kirti Rani, Kishor Gaikwad Suresh Kumar and Archana Singh (2019) Biochemical and molecular characterization of salinity induced responses in pigeonpea (<i>Cajanus cajan</i> L.) genotypes. <i>J. Plant Growth Regul.</i> 38: doi:10.1007/s00344-019-09955-4	8.05
14.	Kumar M, Dahuja A, Sachdev A, Kaur C, Varghese E, Saha S, Sairam KVSS. (2018) Black Carrot (<i>Daucus carota</i> ssp.) and black soybean (<i>Glycine max</i> (L.) Merr.) anthocyanin Extract: A remedy to enhance stability and functionality of fruit Juices by copigmentation. <i>Waste and Biomass Valorization</i> doi: 10.1007/s12649-018-0450-3	7.87
15.	Kumar M, Dahuja A, Sachdev A, Kaur C, Varghese E, Saha S, Sairam KVSS., (2018) Valorisation of black carrot pomace: microwave assisted extraction of bioactive phytochemicals and antioxidant activity using Box–Behnken design. <i>J. Food Sci. Technol.</i> 56(2): 995-1007.	7.80
16.	Punjabi M, Bharadvaja N, Sachdev A, and Krishnan V, (2018) Molecular characterization, modeling, and docking analysis of late phytic acid biosynthesis pathway gene, inositol polyphosphate 6-/3-/5- kinase, a potential candidate for developing low phytate crops. <i>3 Biotech</i> , 8: 344 doi: 10.1007/s13205-018-1343-7	7.50
17.	Tewari K, Kumar V, Kumar A, Bansal N, Vinutha T, Ali K, Sachdev A, Kumari S, Dahuja A. (2018) Molecular cloning and functional analysis of	7.50

	the promoter of γ -Tocopherol Methyl Transferase (γ -TMT) gene of soybean (<i>Glycine max</i>). 3 Biotech , 8:325 doi: 10.1007/s13205-018-1347-3	
18.	Changan S. S., Ali K, Kumar V., Garg N. K. And Tyagi A. (2018) ABA biosynthesis in rice: Anomalous behavior of 9-cis-epoxycarotenoid dioxygenase1 (NCED1) gene under water deficit stress. <i>Biol. Plantarum</i> 62 (4):663-670	7.42
19.	Parveen, S., Kumar, R. R., Anand, A., & Singh, B. (2018). Combined deficiency of nitrogen and iron increases senescence induced remobilization of plant immobile iron in wheat. <i>Acta Physiol Plant</i> 40(12): 211.	7.30
20.	Hada A, Krishnan V, MS Mohamed Jaabir, Kumari A, Jolly M, Praveen S, Sachdev A, (2018) Improved <i>Agrobacterium tumefaciens</i> -mediated transformation of soybean [<i>Glycine max</i> (L.) Merr.] following optimization of .culture conditions and mechanical techniques. <i>In Vitro Cell. Develop. Biol. Plant</i> 54(6): 672-688.	7.06
21.	Hada A, Veda Krishnan, M. S. Mohamed Jaabir, Archana Kumari, Monica Jolly, Shelly Praveen, Archana Sachdev (2018) Improved <i>Agrobacterium tumefaciens</i> -mediated transformation of soybean [<i>Glycine max</i> (L.) Merr.] following optimization of culture conditions and mechanical techniques. <i>In Vitro Cell. Develop. Biol. Plant</i> https://doi.org/10.1007/s11627-018-9944-8 .	7.06
22.	Krishnan V, Hada A, Marathe A, Palaka BK, Ampasala DR, Praveen S, Manickavasagam M, Sachdev A, (2019) Functional characterization of GmITPK (myo-inositol: 1, 3, 4 tris phosphate 5/6 kinase) isoforms—‘so different yet so similar. <i>J. Plant Biochem. Biotechnol.</i> 28(4): 389-396	6.77
23.	Kumar, R.R., Goswami, S., Dubey, K., Singh, K., Singh, J.P., Kumar, A., Rai, G.K., Singh, S.D., Bakshi, S., Singh, B., Pathak, H., Viswanathan, C., Rai, R.D., Praveen, S. (2018) RuBisCoactivase—a catalytic chaperone involved in modulating the RuBisCo activity and heat stress-tolerance in wheat. <i>J. Plant Biochem. Biotetchnol.</i> 28 (1): 63-75	6.77
24.	Mawlong I, Kishwar Ali and Aruna Tyagi (2018) Functional validation of a water deficit stress responsive AP2/ERF family transcription factor encoding gene in <i>Oryza sativa</i> . <i>Ind. J. Biochem. Biophys.</i> 55: 17-25.	6.39
25.	Kumar V, Amresh Kumar, Kishwar Ali, Kalpana Tewari, Nitin Kumar Garg, Sushil S. Changan, and Aruna Tyagi (2018) Cloning and Heterologous expression of Os-AP2/ERF-N22 drought inducible rice transcription factor in <i>E. coli</i> . <i>Ind. J. Agri. Sci.</i> 88(10):1515-20.	6.23
26.	Pradhan S, AK Goswami, SK Singh, Jai Prakash, Suneha Goswami, Chinnusamy Viswanathan, AkshayTalukdar, VK Sharma (2018) Growth, nutrient acquisition and physiological responses of papaya (<i>Carica papaya</i>) plants to controlled low temperature stress. <i>Ind. J Agril Sci.</i> 88(5): 726-732	6.22

27.	Kumar M, Dahuja A, Sachdev A, Kaur C, Varghese E, Saha S. and Sairam KVSS. (2018) Valorization of Black carrot marc: Antioxidant properties and enzyme assisted extraction of flavonoids. <i>Res. J. Biotechnol.</i> 13: 12-21.	6.00
28.	Kumar, R.R., Tasleem, M., Singh, K., Ahuja, S., Sakhare, A., Kumar, S., Goswami, S., Singh, S.D., Singh, G.P., Viswanathan, C., Praveen, S. (2019). NO protect the wheat embryo from oxidative damage by triggering the biochemical defence network and amylolytic activity. <i>Plant Physiol Rep.</i> 24: 35-45.	5.18
29.	Kapoor, N., Arzoo, Sakshi, Singh, J., Sirohi, A., Kumar, R.R. (2018). Role of silver nanoparticles synthesized by growth and development of fenugreek plant. <i>Bull. Env. Pharmacol. Life Sci.</i> , 8(1): 154-161.	5.00
30.	Praveen, S., Singh, A., Krishnan, V. (2018) Molecular assembly of starch granules: interplay of metabolizing enzymes in rice. <i>J Rice Res.</i> 10: 1-10.	3.22
2017-18		
1.	Krishnan V, Gothwal S, Dahuja A, Vinutha T, Singh B, Jolly M, Praveen S, Sachdev A. 2018. Enhanced nutraceutical potential of gamma irradiated black soybean extracts. <i>Food Chem.</i> 245: 246-253.	10.53
2.	Krishnan V, Gothwal S, Dahuja A, Vinutha T, Singh B, Jolly M, Praveen S, Sachdev A. 2018. Enhanced nutraceutical potential of gamma irradiated black soybean extracts. <i>Food Chem.</i> 245: 246-253.	10.53
3.	Samota MK, Sasi M, Awana M, Yadav OP, Amitha Mithra SV, Tyagi A, Kumar S, Singh A. 2017. Elicitor-induced biochemical and molecular manifestations to improve drought tolerance in rice (<i>Oryza sativa</i> L.) through seed-priming. <i>Front. Plant Sci.</i> 8:934.doi: 0.3389 / fpls. 2017. 00934.	10.30
4.	Kumar S, Beena AS, Awana M, Singh A. 2017. Physiological, biochemical, epigenetic and molecular analyses of wheat (<i>Triticum aestivum</i>) genotypes with contrasting salt tolerance. <i>Frontiers in Plant Science</i> 8:1–20. doi:10.3389/fpls.2017.01151	10.30
5.	Kumar RR, Goswami S, Shamim Md, Mishra U, Jain M, Singh K, Singh JP, Dubey K, Singh S, Rai GP, Singh GP, Pathak H, Chinnusamy V, Praveen S. 2017. Biochemical defense response: Characterizing the plasticity of source and sink in spring wheat under terminal heat stress. <i>Frontiers in Plant Science.</i> doi: 10.3389/fpls.2017.01603.	10.30
6.	Gupta OP, Nigam D, Dahuja A, Kumar S, Vinutha T, Sachdev A, Praveen S. 2017. Regulation of isoflavone biosynthesis by miRNAs in two contrasting soybean genotypes at different seed developmental stages. <i>Front. Plant Sci.</i> 8:567. doi: 10.3389/fpls.2017.00567	10.30
7.	Singh S, Kumar NR, Maniraj R, Lakshmikanth R, Rao KYS, Muralimohan N, Arulprakash T, Karthik K, Shashibhushan NB, Vinutha T, Pattanayak D, Dash PK, Kumar PA, Sreevathsa R. 2018. Expression of Cry2Aa, a <i>Bacillus thuringiensis</i> insecticidal protein in transgenic pigeon pea confers resistance to gram pod borer, <i>Helicoverpa armigera</i> . <i>Sci. Rep.</i> 8:8820. DOI:10.1038/s41598-018-26358-9	10.26

8. Kumar RR, Goswami S, Shamim M, Dubey K, Singh K, Singh S, Kala YK, Niraj RRK, Sakhrey A, Singh GP, Grover M, Singh B, Rai GK, Rai AK, Chinnusamy V, Praveen S. 2017. Exploring the heat-responsive chaperones and microsatellite markers associated with terminal heat stress tolerance in developing wheat. <i>Functional & Integrative Genomics</i> 17: 621-640.	9.50
9. Singh A, Permar V, Jain RK, Goswami S, Kumar RR, Canto T, Palukaitis P, Praveen S. 2017. Induction of cell death by tospoviral protein NSs and the motif critical for cell death does not control RNA silencing suppression activity. <i>Virology</i> 508: 108-117.	9.35
10. Vinutha T, Bansal N, Khushboo K, Rama G, Sreevathsa R, Veda K, Sweta K, Dahuja A, Lal SK, Sachdev A, Praveen S. 2017. Comparative analysis of tocopherol biosynthesis genes and its transcriptional regulation in soybean seeds <i>J. Agric. Food Chem.</i> 65: 11054-11064	9.15
11. Mishra P, Singh S, Rathinam M, Nandiganti M, Ram Kumar N, Thangaraj A, VinuthaT, Krishnan V, Mishra V, Jain N, Rai V, Pattanayak D, Sreevathsa R. 2017. Comparative proteomic and nutritional composition analysis of independent transgenic pigeon pea seeds harboring cry1AcF and cry2Aa genes and their non-transgenic counterparts. <i>J. Agric. Food Chem.</i> 65: 1395-1400	9.15
12. Li Y, Kumar S, Qian W. 2018. Regulation of plant development by active DNA demethylation. <i>Plant Cell Reports</i> 37: 77–85.	8.87
13. Marathe A, Krishnan V, Vinutha T, Dahuja A, Jolly M, Sachdev A. 2018. Exploring the role of Inositol 1, 3, 4- trisphosphate 5/6 kinase-2 (<i>GmITPK2</i>) as a dehydration and salinity stress regulator in <i>Glycine max</i> (L.) Merr. through heterologous expression in <i>E. coli</i> . <i>Plant Physiol. Biochem.</i> 123:331-341	8.72
14. Kumar RR, Goswami S, Singh K, Dubey K, Rai GK, Singh B, Singh S, Grover M, Mishra D, Kumar S, Bakshi S, Chinnusamy V, Praveen S. 2018. Characterization of novel heat-responsive transcription factor (TaHSFA6e) gene involved in regulation of heat shock proteins (HSPs)—A key member of heat stress-tolerance network of wheat. <i>J. Biotechnol.</i> 279: 1-12	8.67
15. Kumar S, Beena AS, Awana M, Singh A. 2017. Salt-Induced Tissue-Specific Cytosine Methylation Down regulates Expression of HKT Genes in Contrasting Wheat (<i>Triticum aestivum</i> L.) Genotypes. <i>DNA Cell Biol.</i> 36(4): DOI: 10.1089/dna.2016.3505.	8.24
16. Changan SS, Ali K, Kumar V, Garg NK, Tyagi A. 2018. ABA biosynthesis in rice: Anomalous behavior of 9-cis-epoxycarotenoid dioxygenase1 (<i>NCED1</i>) gene under water deficit stress. <i>Biologia Plantarum</i> 62: 663–670	7.55
17. Marathe A, Krishnan V, Mahesh M, Vinutha T, Dahuja A, Jolly M, Praveen S, Sachdev A. 2018. Characterization and molecular modelling of Inositol 1,3,4 tris phosphate 5/6 kinase-2 from <i>Glycine max</i> (L) Merr.: comprehending its evolutionary conservancy at functional level. <i>3 Biotech</i> 8:50	7.50
18. Pandey V, Krishnan V, Bask N, Pandey V, Punjabi M, Hada A, Marathe A, Jolly M, Sachdev A. 2018. Molecular modelling and <i>in-silico</i> characterization of <i>GmABCC5</i> : a phytate transporter and potential target for low-phytate crops. <i>3 Biotech</i> DOI 10.1007/s13205-017-1053-6	7.50
19. Kumar RR, Goswami S, Dubey K, Singh K, Singh JP, Kumar A, Rai GK, Singh SD, Bakshi S, Singh B, Pathak H, Chinnusamy V, Rai RD, Praveen S. 2018.	7.35

RuBisCo activase—a catalytic chaperone involved in modulating the RuBisCo activity and heat stress-tolerance in wheat. <i>Journal of Plant Biochemistry and Biotechnology</i> https://doi.org/10.1007/s13562-018-0463-9 .	
20. Tewari K, Dahuja A, Sachdev A, Kumar V, Ali K, Kumar A, Kumari S. 2017. Molecular cloning, heterologous expression and functional characterization of gamma tocopherol methyl transferase (γ -TMT) from <i>Glycine max</i> . <i>Protein Expression and Purification</i> 140: 81-89.	7.35
21. Thagela P, Yadav RK, Tripathi K, Singh PK, Ahmad A, Dahuja A, Abraham G. 2018. Salinity induced changes in the chloroplast proteome of the aquatic pteridophyte <i>Azolla microphylla</i> . <i>Symbiosis</i> 75: 61-67.	7.30
22. Ramesh SV, Chouhan BS, Kumar G, Praveen S, Chand S. 2017. Expression dynamics of <i>Glycine max</i> (L.) Merrill microRNAs (miRNAs) and their targets during mungbean yellow mosaic India virus (MYMIV) infection. <i>Physiological and Molecular Plant Pathology</i> 100, 13-22.	7.14
23. Hada A, Krishnan V, Kumari A, Jolly M, Praveen S, Sachdev A. 2017. Synergistic studies of culture conditions in combination with mechanical techniques for improving the genetic transformation of soybean. <i>In Vitro Cellular & Developmental Biology</i> Doi.org/10.1007/s11627-018-9944-8	7.02
24. Kumar S, Singh AK, Mohapatra T. 2017. Epigenetics: history, present status and future perspective. <i>Indian Journal of Genetics and Plant Breeding</i> 77(4): 445–463.	6.32
25. Basak N, Krishnan V, Pandey V, Punjabi M, Hada A, Marathe A, Jolly M, Sachdev A. 2017. Molecular characterization of inositol pentakisphosphate 2-kinase from soybean and its expression pattern in the developing seeds. <i>Indian J. Genet. Plant Breed.</i> 77: 371-378	6.32
26. Kumar V, Kumar A, Ali A, Tewari K, Garg NK, Changan SS, Tyagi A. 2018. Cloning and Heterologous expression of <i>Os-AP2/ERF-N22</i> drought inducible rice transcription factor in <i>E. coli</i> . <i>Indian Journal of Agricultural Sciences</i> 88: 1515-1520	6.22
27. Mawlong I, Ali K, Tyagi A. 2018. Functional validation of a water deficit stress responsive AP2/ERF family transcription factor encoding gene in <i>Oryza sativa</i> . <i>Indian Journal of Biochemistry and Biophysics</i> 55: 17-25.	6.00
28. Samota MK, Sasi M, Singh A. 2017. Impact of seed priming on proline content and antioxidant enzymes to mitigate drought stress in rice genotype. <i>Int. J. Curr. Microbiol. App. Sci.</i> 6: 2459-2466.	5.38
29. Ali A, Goswami S, Kumar RR, Singh K, Singh JP, Kumar A, Kumari A, Sakhare A, Rai GK and Praveen S. 2018. Wheat oxygen evolving enhancer protein: identification and characterization of Mn-binding metalloprotein of photosynthetic pathway involved in regulating photosystem II integrity and network of antioxidant enzymes under heat stress. <i>International Journal of Current Microbiology and Applied Sciences</i> 7: 177-192.	5.38
30. Ali A, Goswami S, Kumar RR, Singh K, Singh JP, Kumar A, Kumari A, Sakhrey A, Rai GK, Praveen S. 2018. Wheat oxygen evolving enhancer protein: identification and characterization of Mn-Binding metalloprotein of photosynthetic pathway involved in regulating photosystem II integrity and	5.38

	network of antioxidant enzymes under heat stress. <i>International Journal of Current Microbiology and Applied Sciences</i> 7(02): 177-192.	
31.	Kumar G, Singh A, Vinutha T, Kumar S, Kumar RR, Praveen P. 2017. Possible role of miRNAs and their targets, in modulating leaf morphology and plant growth during leaf curl virus infection in tomato. <i>Indian Journal of Plant Physiology</i> 22: 608-615	5.18
32.	Kumar M, Kumar RR, Goswami S, Verma P, Rai RD, Chinnusamy V, Praveen S. 2017. miR430: the novel heat-responsive microRNA identified from miRNome analysis in wheat (<i>Triticum aestivum</i> L.). <i>Indian Journal of Plant Physiology</i> 22: 566–576	5.18
33.	Goswami S, Kumar RR, Chinnusamy V, Praveen S. 2017. In planta silencing of NSs and Hc-Pro through RNAi constructs: to develop durable resistance. <i>Indian Journal of Plant Physiology</i> 22: 577–586.	5.18
34.	Kapale V, Awana M, Singh A, Yadav OP. 2017. Biochemical and molecular defence mechanism in pigeon pea genotypes against salinity stress. <i>Indian Res. J. Genet. Biotech.</i> 9: 566 – 572	4.95
35.	Singh K, Mittal P, Verma N, Singh S, Goswami S, Kumar RR. 2017. Evaluation of biochemical traits to complement empirical selection for wheat (<i>Triticum aestivum</i>) under heat stress. <i>Curr. Adv. Agric. Sci.</i> 9:70-75.	4.69
2016-17		
1.	Xiaokang Wang, Qi Li, Wei Yuan, Suresh Kumar, Yan Li and Weiqiang Qian (2016) The cytosolic Fe-S cluster assembly component MET18 is required for the full enzymatic activity of ROS1 in active DNA demethylation. <i>Scientific Reports</i> 6: 26443 doi: 10.1038/srep26443.	11.58
2.	Kumari S., Memba L.J., Dahuja A., Vinutha T, Saha S., Sachdev A. (2016). Elucidation of the role of oleosin in off-flavour generation in soymeal through supercritical CO ₂ and biotic elicitor treatments. <i>Food Chem.</i> 205: 264–271.	9.33
3.	Parihar C.M., Jat S.L., Singh A.K., Kumar B., Singh Y., Pradhan S., Pooniya V., Dahuja A., Chaudhary V., Jat M.L., Jat R.K., and Yadav O.P. (2016) Conservation agriculture in irrigated intensive maize-based systems of north-western India: effects on crop yields, water productivity and economic profitability. <i>Field Crops Research</i> 193: 104-116.	8.98
4.	Kumar S.M.S., Ali K., Dahuja A and Tyagi A. (2015) Role of phytosterols in drought stress tolerance in rice, <i>Plant Physiology and Biochemistry</i> , 96 : 83-89.	8.76
5.	Kumar RR, Goswami S, Sharma SK, Kala YK, Rai GK, Mishra DC, Grover M, Singh GP, Pathak H, Rai A, Chinnusamy V and Rai RD (2015) Harnessing next generation sequencing in climate change: RNA-Seq analysis of heat stress-responsive genes in wheat (<i>Triticumaestivum</i> L.). <i>Omics: J. Integra. Biol.</i> 19(10):632-47.	8.73
6.	Kumar R.R., Pathak H., Sharma S.K., Kala Y.K., Nirjal M.K., Singh G.P., Goswami S., Rai R.D. (2015) Novel and conserved heat-responsive microRNAs in wheat (<i>Triticumaestivum</i> L.). <i>Funct.Integr. Genomics.</i> 15(3):323-48.	8.69
7.	Thagela P., Yadav R.K., Mishra V., Dahuja A., Ahmad A., Singh P.K., Tiwari B.S., and Abraham G. (2016) Salinity-induced inhibition of growth in the aquatic pteridophyte <i>Azolla microphylla</i> primarily involves inhibition of	8.65

	photosynthetic components and signaling molecules as revealed by proteome analysis. <i>Protoplasma</i> doi:10.1007/s00709-016-0946-2.	
8.	Mawlong I., Ali K., Srinivasan R, Rai R D and Tyagi A. (2015) Functional validation of a drought-responsive AP2/ERF family transcription factor-encoding gene in Arabidopsis. <i>Molecular Breeding</i> . 35(8) : DOI 10.1007/s11032-015-0290-9.	8.28
9.	Kumar RR, Goswami S, Gupta R, Verma P, Singh K, Singh JP, Kumar M, Sharma SK, Pathak H, Rai RD (2015) The stress of suicide: temporal and spatial expression of putative heat shock protein 70 protect the cells from heat injury in wheat (<i>Triticumaestivum</i> L). <i>J. Plant Growth Regul.</i> 35(1):65-82.	8.06
10.	Kumar S, Sahu N, Singh A (2015) High- frequency in vitro plant regeneration via callus induction in a rare sexual plant of <i>Cenchrusciliais</i> L. <i>In Vitro Cell Dev. Biol.</i> 51:28-34.	7.69
11.	Kumar RR, Goswami S, Verma P, Singh K, Dixit N, Sharma SK, Pathak H, Viswanathan C, Rai RD (2015) Salicylic acid alleviates the heat stress-induced oxidative damage of starch biosynthesis pathway by modulating the expression of heat-stable genes and proteins in wheat (<i>Triticumaestivum</i> L). <i>Acta Physiol. Plant.</i> 37:143	7.52
12.	Krishnan V, Singh A, Vinutha T, Singh B, Dahuja A, Rai, RD, Sachdev A (2015) Irradiation effects on protein profile, solubility, oxidation, scavenger ability and bioavailability of essential minerals in black and yellow Indian soybean (<i>Glycine max.</i> L) varieties. <i>J Radioanal. Nucl. Chem.</i> Doi:10.1007/s10967-015-4193-3.	7.42
13.	Dayal V., Dubey A.K., Singh S.K., Sharma R.M., Dahuja A., and Kaur C. (2016) Growth, yield and physiology of mango (<i>Mangifera indica</i> L.) cultivars as affected by polyembryonic rootstocks. <i>Scientia Horticulturae</i> 199: 186-197.	7.37
14.	Kumar S, Sahu N, Singh A (2015) High- frequency in vitro plant regeneration via callus induction in a rare sexual plant of <i>Cenchrusciliais</i> L. <i>In Vitro Cell Dev. Biol.</i> 51:28-34.	7.16
15.	Pandey V., Krishnan V., Basak N., Hada A., Punjabi M., Jolly M., Lal S.K., Singh S.B., and Sachdev A. (2016). Phytic acid dynamics during seed development and it's composition in yellow and black Indian soybean (<i>Glycine max</i> L.) genotypes through a modified extraction and HPLC method. <i>J. Plant Biochem. & Biotechnol.</i> doi:10.1007/s13562-015-0348-0	7.09
16.	Verma P., Kumar R.R., Goswami S., Sharma S.K., Nirjal M.K., Singh J.P., Dubey K., Pathal H., Rai R.D. (2015) Identification of novel starch synthase genes using de novo assembly and heat-induced expression and activity in developing wheat (<i>Triticumaestivum</i> L.). <i>Indian J. Biochem.Biophy.</i> 52: 41-52	7.08
17.	Goswami, S., Kumar, R.R., Sharma, S.K., Kala, Y.K., Singh, K., Gupta, R., Dhawan, G., Rai, G.K., Singh, G.P., Pathak, H., Rai, R.D. (2015) Calcium trigger protein kinases induced signal transduction for augmenting the thermotolerance of developing wheat grain under heat stress. <i>J. Plant Biochem. Biotechnol.</i> 24(4):441–452.	7.01
18.	Ali, K., and Tyagi, A. (2016) Recent advances in acetyl COA carboxylase; A key enzyme of fatty acid biosynthesis in plants. <i>International Journal of Applied Biology and Pharmaceutical Technology</i> 7(2):264-277.	6.99

19.	Kumar V., Vinutha T, Rajarani A.P, Bansal N., Krishnan V., Dahuja A., Santha I.M., and R.D. Rai (2015). Lipid peroxidation and related parameters strongly influence the storability of soybean (<i>Glycine max.L</i>) seeds. <i>Int. J. Biochem. & Biotech</i> , 4(7): 615-625.	6.88
20.	Krishnan V, Jain P, Vinutha T, Hada A, Manickavasagam M, Ganapathi A, Rai R.D., Sachdev A. (2015) Molecular modeling and <i>in-silico</i> characterization of <i>Glycine max</i> , Inositol (1,3,4) tris 5/6 kinase: A potential candidate gene for developing low phytate transgenics. <i>Plant Omics</i> 8,(5) :381-391.	6.80
21.	Mawlong I, Ali K and Tyagi A. (2016) Cloning and Characterization of a Water-Deficit-Stress Responsive Transcription Factor Gene from Rice (<i>Oryza sativa</i>), <i>Ind. J. Exp. Biol.</i> 54: 26-36	6.75
22.	Ali, K., Rai, R.D., Tyagi, A. (2016) Expression analysis of bZIP transcription factor encoding genes in response to water deficit stress in rice, <i>Ind. J. Exp. Biol.</i> , 54: 332-337	6.75
23.	Bharat B, PalA, Kumar S, Rajesh, Singh A (2015) Evaluation of post-germinative lipid peroxidation and enzymatic antioxidant potential in lead absorbing oat (<i>Avena sativa</i>) seedlings. <i>J. Environ. Biol.</i> 36: 279-288.	6.55
24.	Thagela P., Yadav R.K., Dahuja A., Singh P.K., and Abraham G. (2016) Physiological and proteomic changes in <i>Azolla microphylla</i> roots upon exposure to salinity. <i>Indian J. Biotechnol.</i> 15: 101-106.	6.51
25.	Kumar M, Hasan M, Arora A, Gaikwad K, Kumar S, Rai R D, Singh A (2015) Sodium chloride-induced spatial and temporal manifestation in membrane stability index and protein profiles of contrasting wheat (<i>Triticumaestivum L.</i>) genotypes under salt stress. <i>Ind. J. Plant Physiol.</i> 20:271-275.	4.66
26.	Kumari S., Krishnan V., Jolly M., Sachdev A. (2015) <u>Reduction in phytate levels and HCl-extractability of divalent cations in soybean (<i>Glycine max L.</i>) during soaking and germination.</u> <i>Indian J. Pl. Physiol.</i> 20 (1), 44-49.	4.66
27.	Gupta M.K., Anand A., Paul V., Dahuja Anil, Singh A. K.(2015) Reactive oxygen species mediated improvement in vigour of static and pulsed magneto-primed cherry tomato seeds. <i>Indian J. Plant Physiol.</i> 20(3): 205-212.	4.66
28.	Manimaran B., Srivastava A., Gaur H.S., Dahuja, A., Mohan S., (2015) Biochemical changes and fate of symbiotic bacteria- <i>Photorhabdus</i> in anhydrobiotic <i>Heterorhabditis indica</i> . <i>Indian J. Nematology</i> 45(1): 105-107.	4.56
29.	Mishra A K, Chakraborty O, Pandey B, Tyagi C, Singh A, Kumar A, Jain A K (2016) <i>In-silico</i> prediction of cis-regulatory elements and functional domains of salt-stress ESTs in <i>Glycine max</i> . <i>Ind. J. Agri. Biochem.</i> 28 (2), 166-171.	4.03