NIANP News & Views

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Director, NIANP

Director's Desk

Dear Readers,

Cheerful Greetings on the occasion of New Year – 2015. I wish you all a Very Happy, Prosperous and pleasant year throughout.

I am happy to share with you that the passing year 2014 has been one of continued success for our Institute as we had the satisfaction of partaking several remarkable achievements attained by ICAR-NIANP Team, giving a fillip to the Institute in its path of alround progress. In the early part of the year, in association with the Animal Nutrition Society of India, the Institute successfully organized GLANCE-2014: Global Animal Nutrition Conference, which was a stupendous success with the participation of nearly 500 participants from within India and abroad.

In the month of October, with the noble example set by our Hon'ble Prime Minister , the staff of the Institute enthusiastically participated in "Swacch Bharat Abhiyan" and contributed in spreading the message of Clean India campaign by undertaking a fresh cleanliness drive in the campus and surrounding area.

In November 2014, to commemorate the 19th Foundation Day of the Institute appropriately, the Institute gates were thrown open to the undergraduates and post graduate students of KVAFSU Veterinary College, Bengaluru. The students, in large numbers, with their inquisitive young minds, enthusiastically visited our laboratory and experimental animal shed facilities and had a good exposure and first-hand experience, which enhanced their knowledge in the course of their study in animal nutrition and animal physiology.

The Institute was visited by several of our peers, who had encouraging words to our work. The Institute had a change of leadership, with my predecessor having superannuated, but the change is only a continuous process of our aim of dedicating ourselves towards ensuring food security, quality nutrition, long-term sustainability of animal production systems in our country through our research programmes and work for the economic betterment of end-users, i.e. the farmers, livestock and animal husbandry practioners and also contribute to the feed industry, in the wake of climate change and its effects.

The UN has declared the year 2015 as International Year of Soils to raise awareness on the importance of healthy soils for a healthy life. I wish to say that this theme is indirectly related to our work as well, with the present scenario of degraded land mass, lesser availability of feed and fodder for the livestock, stress to the animal population etc.

As we realize there are overgrowing expectations from this prestigious Institution, it is our endeavour to work relentlessly for the cause of economic prosperity of farming community, livestock development, contribute towards increased productivity of animals, contribute to feed industry. With our dedicated multi-disciplinary team of scientists, I am sure, we will continue to see sustained and also rapid growth in our work, by venturing into newer and unexplored areas of research like nanotechnology, non-conventional feeding systems, better feed conversion ability, bioinformatics, etc. Words of encouragement, suggestions and ideas from our peers, viewers and well-wishers are always welcome.

Once again, on behalf of ICAR-NIANP, a Happy and Pleasant New Year – 2015 to one and all.

Raghavendra Bhatta

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Research Highlights

Recombinant production and purification of buffalo sperm motility-associated TIMP-2 protein

Here, we are reporting for the first time the association of level of TIMP-2 with the motility of buffalo sperm. In buffalo, two molecular weight forms of TIMP-2 (22.4 and 17.8 kDa) were detected in seminal plasma. Seminal plasmas of asthenozoospermic semen samples were associated significantly with lower expression of TIMP-2 proteins as compared with that of normozoospermic semen. Asthenozoospermic seminal plasma with reduced level of TIMP-2 was also associated with significantly higher amount of matrix metalloproteinases (MMPs). Conversely, normozoospermic seminal plasma with increased level of TIMP-2 demonstrated significantly lower level of MMPs. Thus, TIMP-2 proteins appear to have potential to serve as motility marker for buffalo semen. To use this protein as a marker and for developing fertility assay to screen sub-fertile buffaloes, recombinant buffalo TIMP2 could be produced in *E. coli* and purified successfully (Fig.1) as commercially available antibodies are very expensive and less specific.

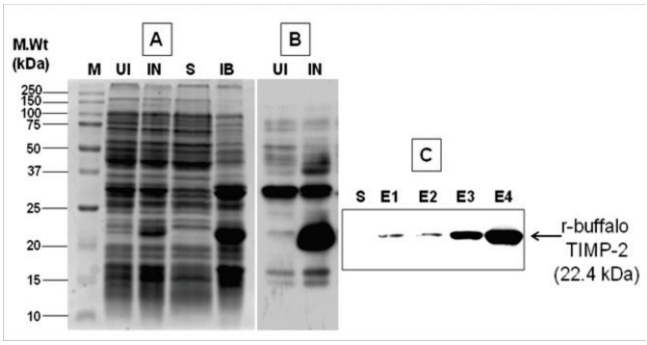


Fig. 1: A. 12.5% SDS-PAGE analysis of recombinant buffalo TIMP-2 expression in *E. Coli*, M: standard molecular weight markers, UI: un-induced bacterial lysate, IN: lysate from recombinant *E. Coli* induced with L-rhamnose, S: Soluble fraction after treatment of *E. Coli* with 20 mM Tris-Cl, pH 7.4 with 150 mM NaCl and 1% Triton X-100 (TBS-T), IB: inclusion body and nuclear fractions. B. Western detection of recombinant buffalo TIMP-2 in un-induced (UN) and induced (IN) bacterial lysate. C. Western detection of recombinant buffalo TIMP-2 in different fractions obtained by passing the inclusion body extract through Ni-NTA His binding column, S: soluble fraction, E1-E4: Eluents of the Ni-NTA His binding column treated with 0.01M Tris-Cl containing 8M urea and 0.1 M NaH_2PO4 with pH 8.0, 6.3, 5.9 and 4.5, respectively.

Transcriptome analysis of BCB screened oocytes in sheep

Whole transcriptome analysis was performed to assess the entire biological functional process of BCB screened sheep oocytes. Total RNA was extracted from the BCB+ and BCB- oocytes (N=10 in each group), 10 ng of total RNA was used for ds cDNA synthesis, which was then amplified by LD PCR. Amplified product was sheared by the covaris system and sequencing library was generated. The libraries were subjected to deep sequencing using 2×150 PE chemistry on Illumina platform. The number of reads generated were 12,252,146 and 8,854,712 respectively in metabolically silent (BCB+) and active (BCB-) oocytes. When these reads were mapped against the reference cattle genome, 5,427,156 and 1,476,528 reads were mapped respectively in metabolically silent and active oocytes. A total number of 4790 and 4252 genes were detected in the metabolically active and silent oocytes respectively, and 914 and 945 genes were found significantly ($P<0.05$) up regulated and down regulated respectively, in metabolically active oocytes compared to their silent counterpart (Fig. 2). When differentially expressed genes were related to biological process, it was observed that functions related to protein folding, protein transport, response to stress, lipid metabolic process, embryo development, negative regulation of apoptotic process, transcription, positive regulation of protein kinase B signalling cascade, protein secretion, oocyte maturation and mRNA metabolic process were more prominent in the active compared to silent oocytes.

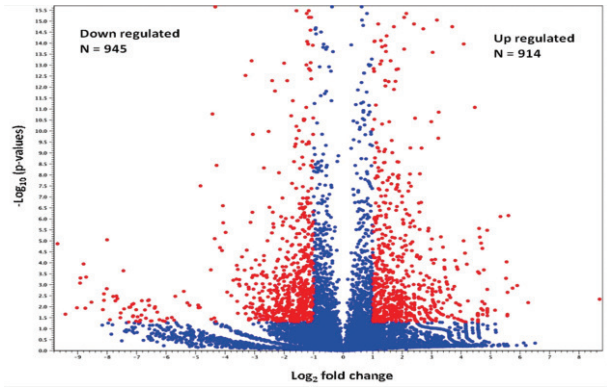


Fig 2. Volcano plot of differentially expressed genes in BCB- oocytes compared to BCB+. Red dot represents differentially expressed ($p<0.05$) genes

Production of recombinant laccase in *Pichia pastoris*

Laccases are blue copper oxidase enzymes which catalyse the oxidation of both phenolic and non phenolic lignin related compounds with the concomitant reduction of molecular oxygen to water. Because of their broad substrate range, they are being used for several biotechnological and environmental applications. Here we report the successful production of recombinant laccase using synthetic gene in *Pichia pastoris* system. *Laccase gene of S. commune* was synthesized artificially incorporating suitable restriction sites. The synthetic gene was codon optimized for *Pichia pastoris and cloned into a shuttle vector.* The expression construct was linearized thereafter and transformed into *Pichia pastoris* GS115(his4) strain by electroporation. Extracellular expression of laccase was performed under methanol inducible conditions (Fig. 3).

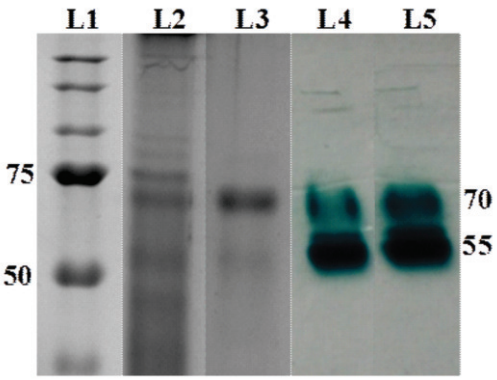


Fig. 3. L1: protein standard marker; L2: culture media following methanol induction; L3: commercial laccase; L4: bioactivity assessment of recombinant laccase by ABTS assay; L5: bioactivity assessment of commercial laccase by ABTS assay

Awards/ Recognitions

K. S. Roy, Principal Scientist was conferred Dr. A. Roy Memorial Award-2013 by "Society of Animal Physiologists of India" on 27th November, 2014 during the 23rd Annual Conference and National Symposium on "Physiological determinants of climate resilient and sustainable animal production" at CIRB, Hisar.

A. K. Samanta Principal Scientist and his Team **(A. P. Kolte, M. Sridhar, S. Senani and C. S. Prasad)** was conferred prestigious ICAR Team research award 2012-13. The award was given for the cutting edge research for production of prebiotics from agricultural wastes like corn cobs, coconut pith, sugarcane bagasse, natural grass and tobacco and cotton stalks.

Sri Raghavan, PS to Director won 2nd Prize in Tolic Hindi cross word and Story writing competition on 19-12-2014

Visits abroad

R. Bhatta, Director attended the sixth meeting of Global research aliance livestock research group organised by Ministry of Agriculture, Indonesian Agency for Agricultural Research and Development, Yogyakarta, Indonesia from 14-11-2014 to 15-11-2014

Visiting Scholar

Prof. Dr. (Mrs) Sayda Ali, Head of the Department of Animal Science, Faculty of Agricultural Sciences, Gezira University, Sudan has joined NIANP for three months (20-10-2014 to 20-01-2015) under DST, CV RAMAN International Fellowship for African Researchers for undertaking a short term study on "Response of super dosing of phytase in normal or low phosphorus-calcium diet of broiler chicken".

Events

ICAR Foundation Day celebration
on 16-7-2014

Training on Ration Balancing
on 25-7-2014

Technology awareness workshop
on 25-7-2014

AICRP launch workshop
on 26-7-2014

Independence Day celebration
on 15-8-2014

ICAR sponsored short course inauguration on 18-8-2014

Hindi Pakwada celebration
on 15-9-2014

Online ARS examination
on 22-9-2014

Swachchata Abhiyan
on 02-10-2014

Training on LASER software on 07-10-2014

Midterm IRC Meeting on 30-10-2014

Vigilance Awareness Day celebration on 01-11-2014

ICAR sponsored Winter school on 12-11-2014

Institute Foundation Day celebration on 24-11-2014

IMC Meeting on 27-12-2014

Seminars/Lectures/Others

Date	Events
16.07.2014	Quiz contest for NIANP Students
16.07.2014	Talk on "Role of ICAR on Development of Indian Agriculture and Education"
25.10.2014	Seminar on "Near Infrared Spectrometry (NIRS) for evaluation of forage quality"
26.09.2014 to 16-10-2014	Industrial experience and training on "Climate Change and Livestock Production"

Field workshops

To ensure technical and advisory support to the State Dept. officials and the farming community in the field due to the current monsoon situation, a team of experts were formed from NIANP, NIVEDI, IVRI and KVKs. A number of technical workshops were conducted on "Contingency measures for livestock feeding, health and management during adverse weather condition" at different districts of Karnataka from July to September 2014. General recommendations were given to State Dept. officials and KVKs to address the problems faced due to deficit monsoon

Visitors

Delegates, USDA
visited on 10-7-2014

Dr. A.K. Rawat, J.D., DBT
visited on 26-9-2014

Sri. T. Nanda Kumar, Chaiman
NDDB visited on 15-9-2014

Veterinary students, KVAFSU
visited on 24-11-2014

Dr. KML Pathak, DDG (AS), ICAR
visited on 18-12-2014

Personnel

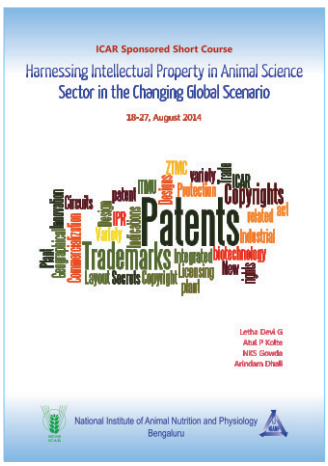
Dr. Raghavendra Bhatta joined as Director, NIANP on 14.08.2014

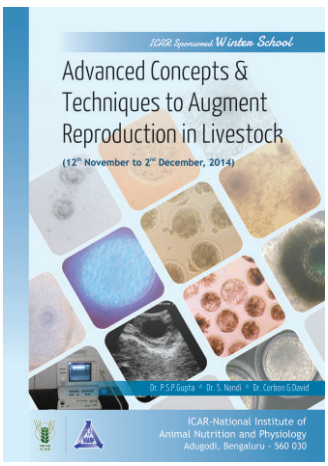
Mrs. Maya. G joined as Technical Assistant T3 (Lab Technician) on 23.09.2014

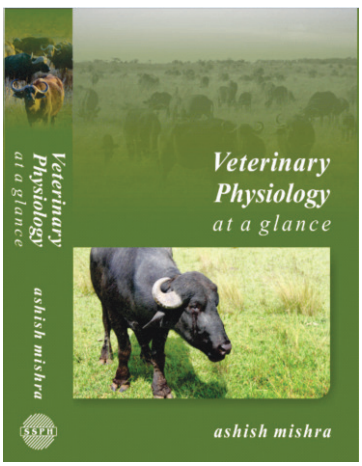
Patent

Thermostable and pH stable laccases (5962/CHE/2014, Filed on 28/11/2014)

Publications







Laboratory Profile

Omics Laboratory

The laboratory was established in 2010 to cater the advanced requirements of Omics technologies in existing research work and mandated to work on application of high throughput technologies. The laboratory is equipped to handle transcriptomics, metagenomics and proteomics protocols and bioinformatics data analysis. The laboratory is a member of "Ashoka Supercomputing Facility" developed by ICAR. The recent research investigations carried out in the laboratory are mentioned below.

- Oocyte transcriptome to unravel determinants of development competence
- Sperm transcriptomics to identify subfertile semen/ bulls
- Liver transcriptomic insights into aflatoxin toxicity in broiler birds
- Microbial community analysis based on Terminal Restriction Fragment Analysis in prebiotic and herbal residue supplementations
- Microbial community analysis based on amplicon sequencing of 16s rDNA tags for assessing impact of methane reduction through plant bioactive compounds
- Metagenome sequencing of rumen microbes in domestic livestock species
- Production of recombinant proteins in bacteria and yeast systems

Salient Achievements

Liver transcriptome analysis of aflatoxin (AFB1) treated birds revealed 330 and 377 genes were uniquely present in AFB1 treated and control respectively. Overrepresentation analysis of AFB1 up-regulated genes based on gene ontology molecular function revealed enrichment of catalytic activity comprising SOD activity, acetyl coA dehydrogenase activity, cytochrome C oxidase activity, alcohol dehydrogenase activity, peroxiredoxin activity, serine threonine type endopeptidase activity, intramolecular oxidoreductase activity, glutathione transferase activity etc.

T-RFLP and 16S rDNA amplicon analysis demonstrated that the herbal residue and inulin supplementation in pigs has equivalent effect on gut microflora as compared to antibiotic addition.

16S rDNA amplicon analysis on Ion Torrent platform evaluated for microbial community disbiosis, if any. The analysis confirmed that the normal function of rumen is not affected by tannin supplementation, especially the fibre degrading bacteria were unaffected by tannin supplementation.

Transcriptome analysis of high and low fertile bulls revealed differences in the gene expression as well as intact transcripts in the sperm. The intact transcripts can be used as biomarker for evaluation of semen fertility.

Transcriptome analysis of metabolically active and silent sheep oocytes revealed remarkable differences in the cell functional and molecular processes between the groups that can be exploited to augment oocyte development competence.

"It does not require money,
to live neat, clean and dignified.."

Mahatma Gandhi

स्वच्छ भारत

एक कदम स्वच्छता की ओर

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