

Proceedings of the IX Annual Review Meeting of Niche Area of Excellence (NAE) Programme

The IX Annual Review Meeting of Niche Area of Excellence Programme was held on 25th May, 2015 at Conference Facility, NAS Complex, New Delhi from 9.00 AM onwards under the chairmanship of Dr. S. Ayyappan, Secy. DARE & DG, ICAR. The following experts participated:

- Dr. Arvind Kumar, DDG (Agricultural Education)
- Dr. B Meenakumari, DDG (Fishery Science)
- Dr. NK Krishna Kumar, DDG (Horticultural Science)
- Dr. AK Sikka, DDG (Natural Resources Management)
- Dr. K Alagusundaram, DDG (Agricultural Engineering)
- Dr. AK Singh, DDG (Agriculture Extension)
- Dr. Jeet Singh Sandhu, DDG (Crop Science)
- Dr. M. L. Madan, Former DDG (Animal Science)
- Dr. M. P. Yadav, Former VC, SVBPUAT, Meerut
- Dr. K. K. Vass, Former Director, CIFRI, Kolkata
- Dr. B. Gangwar, Former Director, IIFSR, Modipuram
- Dr. Bangali Baboo, Former National Director, NAIP
- Dr. T. R. Sharma, Director, NRCPB
- Dr. B. N. Tripathi, Director, NRCE, Hisar
- Dr. D. K. Benbi, National Prof., PAU, Ludhiana
- Dr. V. Upadhyay, Professor & Co-ordinator, NPTEL, IIT-Delhi
- Dr. V. S. Reddy, Group Leader, ICGEB, New Delhi
- Dr. M. S. Saini, Professor, Dept. of Zoology, Punjabi University, Patiala
- Dr. S. R. Bhat, Principal Scientist, NRCPB, New Delhi
- Dr. Dhyan Singh, Former Principal Scientist, Div. of SSAC, IARI, New Delhi
- Dr. Gaya Prasad, ADG (Animal Science)
- Dr. Madan Mohan, ADG (Marine Fisheries)
- Dr. S D Singh, ADG (Inland Fisheries)
- Dr. MB Chetti, ADG (HRD)
- Dr. S Mauria, ADG (IPTM & PME)
- Dr. PS Pandey, ADG (EP & HS)
- Dr. K.L. Khurana, Pri. Sci., Education Division
- Dr. Vanita Jain, Pri. Sci., Education Division

Dr. Arvind Kumar, DDG (Agricultural Edn), ICAR, welcomed the Chairman, invited experts, DDGs, other colleagues from Education Division, the PIs and Co-PIs, who had come from various States of the country. He elaborated the concept and genesis of Niche Area of Excellence, which was launched in the X Plan for the first time with the objective to achieve educational excellence in teaching, research, consultancy and other services. He briefed the house about the achievements made under the programme by the various centre still date and raised the issues pertaining to Niche Area of Excellence and underlined the continuing importance of agricultural research, education and extension for sustaining agricultural production against the odds of reducing profitability, increasing global competition, and adverse impact of biotic and abiotic stresses. He reiterated the criticality of capacity building as the core

mandate for this programme. He gave a brief overview of the thrust areas piloted in the XII Plan by the Education Division in enhancing the quality and capacity building in the agricultural universities and highlighted the new initiatives under consideration. He stressed that the purpose of the review meeting will not be based only for asking the deliverables but also to get feedback where we faltered and why. The subject matter experts may look into these issues and clearly suggest action points for continuing, strengthening or changes in the NAE programme.

Dr. S. Ayyappan, Secretary, DARE and DG, ICAR appreciated the important accomplishments and excellent achievements of some of the centres. He appreciated the fact that some centres have managed to attain visibility globally, attracting due recognition and collaboration, resulting in important linkages. He emphasized the importance of capacity building and technology generation through this programme. He requested the experts to suggest pruning of non performing centers. He was of the view that NAE is a brand name for the institute signifying recognition of the host institution in the identified areas and emphasized the need for more scientific publications from the NAE. He hoped that institutions will form core group of committed and competent faculty in the area.

The inaugural session was followed by Three technical sessions spread over entire day wherein the programme-wise salient achievements for the year 2014-15 and technical programme for the year 2015-16 were presented. Invited experts as resource persons, offered valuable suggestions and inputs and discussed the way forward.

Technical Session I **Plant Sciences, Plant Protection & Horticulture Science**

Seven programmes under Plant Science, Plant Protection & Horticulture science were presented and discussed.

1. Integrated centre for drought research: Genetic enhancement of crops by molecular approaches and phenotyping (UAS, Bangalore). The PI, Dr M. Udayakumar presented the salient achievements.

Salient Achievements:

- ❖ Mini lysimeter phenomic facility with 450 mini lysimeter with an automated ET interfaced water delivery system for precise imposition of moisture stress and real time measurement of transpiration established.
- ❖ Groundnut transgenics with Ipt and multigene (Alfin1::HSF4::PDH45) transgenic lines developed.
- ❖ Six promising rice transgenics expressing EcNAC1::EcZIP60::EcMYC57 ready for advanced field trials.
- ❖ Several marker free transgenic expressing genes regulating translation machinery and genes for roots are also promising.
- ❖ Confirmed the superior productivity of an introgressed line KMP-175 with and yield advantage of 22% under semi irrigated aerobic cultivation.

- ❖ Trait introgression through marker assisted Multi parent backcrossing strategy of developing superior lines in the background of IR-64 is highly promising.
- ❖ Trait donor lines for drought adaptive traits in rice have been identified and have potential to be registered with PVPFRA as useful genetic resources which crop breeders can exploit.
- ❖ Two Training Programs for 15 days and one for 6 days were conducted.

Specific comments

- i. The expert committee appreciated the progress of the programme.
- ii. The centre must focus on the finding the most susceptible and relevant stage and address the quality aspects due to stress.
- iii. Need for collaboration with groundnut and rice breeders.
- iv. In view of the huge data being generated bioinformatics programme must be strengthened.
- v. Additional support as per the need may be provided to complete the phenomic facility.
- vi. The capacity building under the programme must be strengthened
- vii. The Centre should provide platform to other institutes also to work on the same field.

2. Molecular Breeding and genetic manipulation of rice and pigeonpea (PJSTAU, Telangana). The PI, Dr. Sokka Reddy, presented salient achievements.

Salient Achievements

- ❖ FBR 1-15 seed material was procured from IIRR, Rajendranagar and was verified for *Xa33* gene using RM WR 7.6 marker
- ❖ NLR 145 was checked for the presence of *Pi1* and *Pi2* genes using RM 224 and RM 527 markers, respectively.
- ❖ Identified SMD and/wilt resistant lines.
- ❖ Putative transgenic pigeon-pea plants with the *cry2Aa* gene have been generated using LRG41 and PRG158 genotype.

Specific comments

- i. In view of the uncertainty of the programme, the chair asked the PI to submit the final report and AUC. The remaining fund be returned at the earliest. However, the university was advised to submit a fresh proposal.

3. Exploitation of microbial and genomic resources for plant disease management (UAS, Dharwad). The PI, Dr P. U. Krishanraj, made the presentation.

Salient Achievements:

- ❖ Plants inoculated with AUDT502 + *Ralstoniasolanacearum* showed 90% disease control.
- ❖ 225 actino mycetes isolates were isolated and were screened against *Rhizoctoniasolani*, of which seven showed 100 % inhibition.
- ❖ A metagenomic library of garden soil was constructed comprising of 30,000 clones. The screening of remaining clones is in progress.

- ❖ The disease suppressive soil metagenome was analyzed for their bacterial diversity and screened for the presence of agriculturally important genes
- ❖ Effects of three pre-emergence herbicides, i.e. alachlor, butachlor and pendimethalin, on the population of soil microbial community. The three herbicides resulted in the decline of native soil microbial community.
- ❖ Molecular breeding for foliar disease resistance in groundnut, BC₁F₁ plants of JL 24 × ICGV 86699 were confirmed using late leaf spot resistance-linked markers and produced a large number of BC₂F₁ plants by crossing with the recurrent parent (JL 24). Confirmation of BC₂F₁ plants is in progress.
- ❖ Eleven accessions of rabisorghum minicore evaluated for charcoal rot incidence and other yield related component traits were found to be highly resistant..
- ❖ A 21 day training on “Utilization of microbial and plant genomic resources for plant disease management” attended by nineteen faculty members.

Specific comments

- ii. The experts felt that that too many aspects were being dealt in the programme.
 - iii. The PI was advised to focus only on few important aspects so that meaningful results with conclusions could be presented.
 - iv. The characterised microbes be deposited in the national facility viz. NAIMCC, at ICAR-NBAIM, Mau.
 - v. Expectations from this programme is very high therefore, it was advised to PI to concentrate on the objective “Microbial resources” and plan the work for rest of the period, accordingly.
- 4. Creation of novel genetic resources through alien and exotic introgression for higher productivity and resistance in wheat and rice (PAU, Ludhiana) and the salient achievements for last year were presented by Dr. Kuldeep Singh, Co-PI.**

Salient Achievements:

- ❖ A set of 288 BC₁F₂ populations from 87 winter wheat x spring wheat crosses were evaluated for target productivity traits and rust resistance.
- ❖ Mapping populations of fifteen major gene winter wheat donors for rust resistance are being explored for gene tagging and marker assisted transfer of dwarfing gene *Rht8*.
- ❖ High grain weight has been transferred from *Ae. tauschii* to bread wheat. QTL for grain weight, length and width has been identified in *Ae. tauschii* background which will be validated in the backcross progenies.
- ❖ BC₂F₁s have been developed from crossing of *T. monococcum*, *T. boeoticum* and *T. dicoccoides* with hexaploid wheat for transfer of high grain number/spike.
- ❖ Micronutrient deficiency tolerant triticale x bread wheat derivatives were identified.
- ❖ Large number of accessions belonging to 17 wild species confirmed for resistance against bacterial blight pathotype 10 and 8.
- ❖ The transfer and mapping of the *O. rufipogon* genes is in progress.
- ❖ Large number of BC₁F₁ plants were generated for the transfer of BPH resistance gene from different accession of *O. nivara*.
- ❖ Phenotyping and genotyping of the selected F₂ population is in progress.

- ❖ The amphiploids (PR122/*O. punctata* IRGC105137) were generated and backcrossed with the cultivars to harness and transfer the productivity traits of *O. punctata*.

Specific comments

- i. The progress was appreciated.
- ii. To focus on the main issue the experts suggested to stop the micronutrient work.
- iii. The centre was advised to share the vast amount of material generated with different Institutes.
- iv. Rht8 may be tested in a standard background alone and in combination to test its true worth.

5. **Capacity building in taxonomy of insects and mites (UAS, Bangalore).** The achievements of the programme were presented by the PI, Dr. V V Belvadi.

Salient Achievements:

- ❖ Conducted 20 training programmes including 6 long duration (21 days) programmes (Taxonomy of insects and mites) for 220 trainees from 18 states.
- ❖ Manuals with pictorial keys prepared for these training programmes have enabled easy learning of identification methods of insects and mites (20 manuals with pictorial keys).
- ❖ A website was established for the programme.
- ❖ A total of 35,728 specimens have been added to the existing collection till date.
- ❖ 36 entomologists, Number of trained entomologists who have continued in taxonomy as measured by the research projects/programmes initiated

Specific comments

- i. The importance of the work in area was appreciated and experts were of the opinion that capacity building programmes at this centre must continue.
- ii. All the information should be available on the web site also.
- iii. It was agreed to extend the programme for two years (up to March, 2017) for Capacity Building/training of the faculty and PI was advised to submit the realistic demand of grant for this activity only.

6. **Exploration & exploitation of *Trichoderma* antagonist against soil borne pathogens (CSAUA&T, Kanpur).** The presentation was by the PI, Dr Mukesh Srivastava.

Salient Achievements:

- ❖ *T. harzianum* resisted temperature up to 50°C for 8 hours (2x10⁶).
- ❖ Propiconazole was found to be compatible with *T. harzianum*.
- ❖ Biopriming of seeds with 5% formulation of *T. harzianum* and *T. viride* increased yield per hectare (<84 and 32 per cent) as compared with control, respectively.
- ❖ Crude mycolytic enzymes derived from *T. harzianum* applied on wilt infected seeds of chickpea improved germination and related parameters.
- ❖ Paraffin oil based liquid formulation of *T. harzianum* had the survival rate of eleven months.
- ❖ Pure spores of *T. harzianum* @ 0.004g/kg were incorporated in FYM under field trial, suppressed diseases.
- ❖ *Trichoderma* Library was developed and is available on University website. (<http://www.csauk.ac.in/nae.html>)

Comments

- i. The experts were of the opinion that findings were not very significant.
- ii. Statistical analysis was missing in the presentation, although, given in the report.
- iii. Progress of the work need to be given as per objectives and technical programme.
- iv. The controls were not defined while making the presentation.
- v. The centre was asked to complete the work, compile and submit the final report and deposit the material with the Bureau, ICAR-NBAIM, Mau. Accordingly, it was decided to conclude the programme by March, 2016.

7. Pollination management research in apples and other fruits in Kashmir valley (SKAUST-Kashmir). The achievements were presented by Dr, Tejpratap, VC, SKUAST-K.

Salient Achievements:

- ❖ Pollinators identified: 05species
- ❖ Wooden bee blocks and reeds were installed in apple orchards for creating nesting habitats for wild pollinators in district Shopian and Budgam , 70% success was achieved.
- ❖ Identified 40 pollen and nectar producing plants.
- ❖ Nectar content of 60 plants estimated
- ❖ Nectar-sugar content of 40 plants estimated
- ❖ Pollenizers distributed: 60,000
- ❖ Colonies sold to Horticulture Department for pollination service for distribution among fruit growers under MIDH scheme:

Specific comments:

- i. The progress of the programme was satisfactory.
- ii. The other insect fauna of the Kashmir valley especially at the time of apple flowering may be identified.

Technical Session II

Animal & Fishery Sciences

Ten programmes under Animal sciences and three under Fishery Sciences were presented and discussed.

1. Development of bio-sensors for diagnosis of *Peste des petits ruminants* (PPR) and Brucellosis (IVRI, Izatnagar). The achievements under the programme were presented by the PI, Dr Sameer Srivastava

Salient Achievements:

- ❖ Recombinant proteins of *Brucella* [P-17, OMP-25 and OMP-28] were up-scaled, purified and immobilized separately on SPR sensor surfaces
- ❖ Three diagnostic SPR biosensor assays for sero-diagnosis of brucellosis were standardized.
- ❖ Field sera samples were screened with the developed biosensor assay

- ❖ Three different Indirect ELISAs using recombinant OMP-25, OMP-28 and P-17 proteins were standardized and compared with SPR and RBPT
- ❖ Two peptides (OMP-25) and one peptide (OMP-28) were characterized for their reactivity with *Brucella* positive serum samples. The epitope specific anti-peptide antibodies raised against these multiple antigenic peptides were reactive with corresponding recombinant proteins in Western Blot and SPR
- ❖ Label-free assay for detection of PPR virus using mAb and pAb fabricated SPR surfaces was optimized
- ❖ Epitope for anti-N mAb of PPR virus was mapped and binding affinity was determined.
- ❖ Label-free biosensor assays were developed to detect autoantibody signatures (biomarkers) in cases of Canine mammary tumour in dogs.

Specific Comments:

- i. The progress of the work was appreciated.
 - ii. The centre was suggested to focus on the mandated diseases.
 - iii. Validation of the biosensors for both the diseases be completed by March, 2016.
 - iv. The centre be developed as National Facility to train the faculty.
 - v. The scope of the work could be further expanded and Plan be submitted for the next two years.
2. **Spore based sensor for monitoring pesticide residues in milk (NDRI, Karnal).** The programme achievements were presented by PI, Dr. Naresh Kumar

Salient Achievements:

- ❖ Spore germination was checked in presence of 13 different germinants (sugars & amino acids).
- ❖ Target marker enzymes e.g. aminopeptidase, α -glucosidase, α -galactosidase, β -glucosidase, β -galactosidase, esterase and α -amylase found expressed in *B. megaterium* in presence of different germinant (s)
- ❖ Enzymes expressed during spores germination were screened for inhibition in presence of pesticides.
- ❖ Pesticide inhibition assay on paper strip was standardized

Specific Comments

- i. The progress of the programme was considered to be satisfactory.
 - ii. The centre must deliver spore based biosensor by March 2016 and the programme be concluded.
3. **Animal disease registry and tissue bank (WBUFAS, Kolkata).** The presentation was made by the PI, Dr. J D Ghosh.

Salient Achievements:

- ❖ Among the canine vector borne diseases (CVBD) highest incidence (42%) was recorded for *Babesiagibsoni*.
- ❖ Among the eight dog breeds the GSD (33%) followed by Labrador (32%) and cross-bred dogs (19%) had moderate to high incidence rate of *B. gibsoni*.
- ❖ Mixed infection with two or more vector-borne protozoan/rickettsial pathogens was predominant.
- ❖ The emerging CVBDs e.g. *Anaplasmaplatys*, *Ehrlichiaewingii*, *Theileriaanna* were not recorded using the molecular method of detection.
- ❖ Only **three animals** each out of 79 indigenous and 72 cross-bred cattle of Midnapore, Nadia, Hoogly and South 24-Parganas districts of West Bengal were sero positive for paratuberculosis as tested by the commercially available kit.

Specific Comments

- i. The progress did not confirm with the standard procedure /methodology.
 - ii. It was agreed to conclude the programme by December 2015.
 - iii. The centre was advised to deposit all the materials generated till date in VTCC, Hisar, digitize the resources generated and submit the final report.
4. **Animal disease registry and tissue bank (GADVASU, Ludhiana).** The achievements were presented by the PI, Dr. N. S. Sharma.

Salient Achievements:

- ❖ Phenotypic and Genetic studies on *Staphylococcus aureus* mastitis: Overall out of 49 subclinical mastitis isolates, C1 (95.9%) and RS1 (73.5%) were the most prevalent genotypes irrespective of animal species.
- ❖ Twelve isolates of *S. aureus* from subclinical and clinical cases of mastitis in cows were submitted to Veterinary Type Cultures Collection, Hisar.
- ❖ Canine Parvovirus: Nested PCR was found to be more sensitive than conventional PCR for the detection of CPV.
- ❖ A Multiplex PCR to detect and differentiate the antigenic types of CPV viz. CPV-2, CPV-2a and CPV-2c was successfully designed and tested.
- ❖ The CPV positive cases were also found in dogs that had been vaccinated for virus.
- ❖ A transformed canine cell line i.e. MDCK-dSLAM has been developed constitutively expressing canine SLAM molecule which will help in isolation and culture of canine distemper virus (CDV) field strains.
- ❖ Johne's diseases: The prevalence of *MAP* on the basis of faecal culture and faecal PCR was 15.87% and 25.82%, respectively.
- ❖ Ketosis:Based on the results of MPT, overall prevalence Ca, Mg, Cu, Zn and Pi, deficiencies in cows was 30.69, 21.78, 20.79, 32.67 and 24.75 per cent and in buffaloes 24.55, 19.76, 10.17, 19.16, 25.74 per cent, respectively. Animals diagnosed with hepatic lipidosis (HL) were also having elevated levels of various hepatic enzymes like AST, ALP, GGT, GDH and LDH.

- ❖ Canine Renal Failure: Neutrophilic leukocytosis and presence of bacteria and pus cells in urine sediment may indicate an infectious etiology of renal failure in present study.
- ❖ Tissue Bank (Bio-Specimen Repository): The cases of various diseases, tumors diagnosed and their tissue blocks, H & E stained slides, Special stained slides where applicable and non stained paraffin sections have been kept for future record in the slide cabinets and Block cabinets or as serum samples.

Specific Comments

- i. The progress was satisfactory and as per objectives and technical programme.
 - ii. The centre was advised to continue the work as per defined objectives upto March, 2016.
 - iii. Digitization of the resources generated should be done in an internationally accepted protocol.
 - iv. Emphasis should be on registry and tissue bank. Inventory with retrieving system need to be established.
 - v. Team from the centre may visit the facility at IVRI.
5. **Animal disease registry and tissue bank (KVAFSU, Bidar).** The presentation was by PI, Dr HD Narayanswamy.

Salient Achievements:

- ❖ Canine parvoviral:disease:Hematology analysis revealed Leucopenia, anemia, and decrease in packed cell volume (PCV) in majority of the dogs.
- ❖ PCR assay was employed for the diagnosis of CPV. using VP2ab and VP2b primers.
- ❖ Canine Ehrlichiosis: PCR assay was carried out to confirm the disease.

Specific Comments

- i. The progress did not confirm with the standard procedure /methodology and is not focussed
 - ii. Facilities developed does not commensurate with research.
 - iii. The centre was advised to deposit all the materials generated till date in VTCC, Hisar, digitize the resources generated and submit the final report.
 - iv. It was agreed to conclude the programme by December, 2015.
6. **Wild life forensics and health (NDVSU, Jabalpur).** The presentation was by PI, Dr. AB Srivastava.

Salient Achievements:

- ❖ Validated Bio-technological tools for diagnosis of EEHV in Asiatic elephants.
- ❖ Validated molecular diagnostic tools for diagnosis of leptospirosis, canine distemper, Infectious canine hepatitis and canine parvo viral infection in wild carnivores and feral dogs around Kanha Tiger Reserve.

- ❖ Developed SNP markers of Cytochrome b gene in wild herbivores (13 species) of Madhya Pradesh. PCR-RFLP profile was also developed for the same species using Cytochrome b gene.
- ❖ Developed species specific primers for identification of Indian Wild Pig (*Sus scrofa cristatus*) and differentiated it from the (n=17) pig races of world and filled patent for the primer.
- ❖ Techniques developed for species identification from biological samples such as dried blood stained materials like clothes and weapons used for poaching..
- ❖ Decollaring and treatment of deep maggotised wound of a tiger at Sanjay Tiger Reserve, Madhya Pradesh.
- ❖ Played a major role in planning and execution of reintroduction program of Hard Ground Swamp Deer (*Cervus duacellibranderi*) from Kanha Tiger Reserve to Satpura Tiger Reserve.
- ❖ Initiated quality assessment of drinking water in water holes in remote areas of different Protected Areas in Madhya Pradesh.

Specific Comments:

- i. The progress was considered satisfactory.
 - ii. The PI, was advised not to deviate from objectives while presenting the results and focus on forensics.
 - iii. The annual report may be resubmitted again after restructuring.
 - iv. Approach of achieving the technical programme must be systematic and focussed.
7. **Metagenomic analysis of ruminal microbes (AAU, Anand).** The achievements of the programme were presented by the PI, Dr. C. G. Joshi.

Salient Achievements:

- ❖ Metagenome sequencing of 48 samples of Jaffarabadi and Surti breed each.
- ❖ Metatranscriptome sequencing runs of 48 samples for Kankarej, Gir, Jaffarabadi breeds.

Specific Comments:

- i. The progress of the programme was appreciated.
 - ii. The centre was advised to submit the schedule for the capacity building programmes for the year 2015-16.
8. **Nutrition and gut health; probiotics, prebiotics and phytogetic as functional foods to augment gut health of dogs (IVRI, Izatnagar).** The presentation of the achievements was by Dr. A.K. Patnaik, PI.

Salient Achievements:

- ❖ A canine-origin probiotic *Lactobacillus johnsonii* CPN23 developed following a series of *in vitro* evaluation procedures, partially sequenced (Gen Bank Accession No. KP065494)
- ❖ *In vivo* evaluation of the developed probiotic (in dogs followed by rats) revealed its superiority over the dairy-origin probiotics when used in dogs

- ❖ Pomegranate peel extract (PPE), as a source of polyphenols, positively impacted the gut health, antioxidant status and immunity in rats, and the same was successfully validated in medium breed dogs, thereby proving its potential as a nutraceutical.

Specific Comments:

- i. The progress by the centre and efforts made were very good.
- ii. The research work be taken up as per the objectives of the programme.

9. **Improved and expanded vaccines and immunological understanding of avian viruses (TANUVAS, Chennai).** The achievements were presented by the PI, Dr. K. Kumanan.

Salient Achievements:

- ❖ Whole genome sequencing of IBV and CAV
- ❖ Immunization studies with cell line adapted NDV genotypes II, IV and VII
- ❖ LAMP assay for IBV
- ❖ Recombinant TK antigen based LAT for DPV
- ❖ Recombinant VP1 antigen based ELISA for CAV
- ❖ Sequencing and phylogenetic analysis of duck TLRs
- ❖ Differential inflammatory cytokine responses between duck and chicken

Specific Comments:

- i. The work done by the Centre was appreciated.
- ii. The centre should submit the final report by March, 2016.

10. **Toxico dynamic studies on impact of environmental pollutants on bovine reproduction with particular reference to regulatory pathways (PI-S. K. Garg; DUVASU, Mathura)**

Salient Achievements:

- ❖ Buffalo myometrium possesses both *alpha* and *beta* adrenergic receptors. *Alpha* are excitatory and *beta* are inhibitory in both the pregnant and non-pregnant buffaloes, however, *beta*-adrenoceptors are predominant especially during pregnancy.
- ❖ For the first time reported the functional existence of *beta*₃-adrenoceptor in the myometrium of non-pregnant buffaloes.
- ❖ ATP-sensitive potassium (K_{ATP}) channels -mediated tocolysis seems to be independent of nitric oxide or activation of adenylyl cyclase (AC) enzyme.
- ❖ Forskolin-induced adenylyl cyclase-independent relaxation of myometrium in pregnant buffaloes was observed.
- ❖ Prostaglandin-induced myometrial contraction is significantly lower in pregnant compared to non-pregnant uteri and extracellular source of calcium helped in PG-induced myometrial contraction during pregnancy too.
- ❖ Calcium sensitization mechanism in terms of activation of Rho-kinase pathway plays a major role in PG and oxytocin-induced myometrial contraction in non-pregnant uteri.
- ❖ *In vitro* exposure of rat myometrium to cadmium chloride ($CdCl_2$) reduced myometrial spontaneity and PG-induced contraction.

- ❖ Cadmium-induced myometrial relaxation in rats was independent of activation of nitric oxide pathway and inhibitory *beta* adrenergic receptors.
- ❖ Mercuric chloride (HgCl₂) exhibited dose-dependent contraction in both rat and buffalo myometrium. This calcium- dependent myometrial contraction in rat myometrium is regulated by PKC and Rho kinase. Muscarinic receptors especially M₂ and M₃ are involved in HgCl₂-induced myometrial contraction in rats.
- ❖ Lead-induced buffalo myometrial contraction is PKC dependent.
- ❖ In the absence of extracellular calcium, lead can permeate through L-type calcium channels (VDCC) and activate PKC to mediate myometrial contraction, thus exerting calcium mimicking action.

Specific Comments:

- i. The progress of the programme was satisfactory.
- ii. The focus should be bovines in real life situations.
- iii. The research programme be accomplished by March, 2016 and final report to be submitted.

11. Fish safety and quality assurance (TNFU, Thoothukudi). The presentation was by the PI, Dr G. Jeyasekaran.

Salient Achievements:

- ❖ The samples have been analyzed for different biochemical and microbiological quality parameters.
- ❖ One 21 days capacity building National training programme on “Microbial risk assessment in fresh and processed aquafoods” was conducted for faculty/scientists of SAUs/ICAR;
- ❖ A separate website (www.icarnaefsqa-tnfu.org.in) was developed.

Specific Comments:

- i. Annual report not prepared and needs to be resubmitted as suggested.
- ii. The PI was advised to report only last year’s achievements.
- iii. The centre is not a National Referral Laboratory.
- iv. Work on steroid hormones in fish and sea food may be included as it is serious problem.
- v. The PI may refer to the brain-storming session held in NAAS and look into the safety aspects requirement of the nation as a whole.

12. Surveillance of diseases of aquacultured finfish and shellfish in West Bengal and development of disease management strategies (WBUAFS, Kolkata). The presentation was by the PI, Dr. T. J. Abraham.

Salient Achievements:

- ❖ First report on the incidence of cyprinid herpes virus 3 and cyprinid herpes virus 2 in ornamental fish *Carassius auratus* from India
- ❖ *Cirrhinus mrigala* was the most resistant to stress than *Catla catla* and *Labeo rohita* in sewage fed fish farm as it exhibited low levels of serum glucose, ALT, LDH, creatinine and SOD.
- ❖ Elucidated the restriction fragment length polymorphism (RFLP) profiles of six species of *Argulus*, five species of *Myxobolus* and four species of *Thelohanellus*.

- ❖ The 3D model structure of cytolytic enterotoxin of *A. popoffii* was elucidated (PDB Id-PM0079737). The stereochemical analysis of cytolytic enterotoxin of *A. popoffii* was judged by Ramachandran plot.
- ❖ *Edwardsiellatarda* from diseased *Clariasbatrachus* fry was isolated and characterized by culture independent metagenomic approach
- ❖ Rapid detection of *Edwardsiellatarda* from diseased fish was facilitated by targeting *E. tarda* type 1 Fimbrial gene cluster
- ❖ First report on serum insulin-like growth factor-1 (IGF-1) concentrations in cultured Indian major carps.
- ❖ Growth rate of the sewage fed farm grown fish increased with dietary supplementation of vitamin E with positive effect on liver function.
- ❖ Assessment of specificity of anti-carp enzyme (HRPO) immunoconjugate to *Labeorohitaimmunoglobulin* by direct ELISA revealed the titer of conjugate between 1:200 and 1:400 dilutions.
- ❖ *Edwardsiellatarda* OMP protein was immunogenic. Dot ELISA was able to detect experimental *E. tarda* infection in catfish.

Specific Comments:

- i. It was felt that programme lacked focus although lot of work was done.
- ii. The work at other institutes must be taken into consideration to avoid repetition. The PI was advised to collaborate with CIFA.
- iii. Management plan be initiated along with clearly defined management protocol.
- iv. The PI was suggested to make a list of aquadugs that are being used in West Bengal aquaculture systems.

13. Aquaculture development in Punjab-culturing of high value species and utilizing salt affected /water logged lands (GADVASU, Ludhiana). The presentation was by the PI, Dr Asha Dhawan.

Salient Achievements:

- ❖ Successful brood stock rearing, breeding, seed production of *Heteropneustesfossilis* .
- ❖ Successfully reared advanced fingerlings and fry of *Pangasiuspangasius*, *Clariasbatrachus*, *Channa striatus* and *Channa punctatus*.
- ❖ About 82% higher net income achieved through rearing *Channa punctatus* in cages installed in carp poly culture ponds (catla, rohu, mrigal & common carp).
- ❖ Improved carp poly-culture technology resulting in productivity enhancement from 3.5 to 4.69t/ha/yr in inland saline waters, at stocking density of 20,000 fingerlings/ha (salinity range 4-6 ppt).
- ❖ Integrated fish (carp) cum duck farming technology, enhanced the fish productivity to 4.75t/ha/yr in inland saline waters, at stocking density of 20,000 fingerlings/ha (salinity range 4-6 ppt)
- ❖ Achieved success in culture of brackish water shrimp *Litopenaeusvannamei* (stocked @ 5 PL/m²) successfully in inland saline waters (82.2% survival).

Specific Comments:

- The overall progress by the centre was satisfactory.

- The committee felt that SWOT analysis must be done and Gaps may be addressed in future programmes.
- The programme was concluded in March, 2015 and final report received.

Technical session III

Agriculture Engineering, Agricultural Education & Natural Resource Management

The seven programmes were presented and discussed in this session

1. Pilot scale processes for coarse cereals based functional food through extrusion processing (IARI, New Delhi). The presentation was by the PI, Dr. S. K. Jha.

Salient Achievements

- Pusa Pearl Pasta based on pearl millet and semolina and has been prepared through extrusion processing.
- Ready-to-use Pusa Vita was developed through hot extrusion process from finger millet and soy.
- Development of two-layer feed-forward fully connected neural network model for predicting expansion ratio using temperature, screw speed and moisture content. The continuous unipolar function with sigmoidal features was used as an activation function at hidden and output layers. Out of 30 patterns of data, 24 were used for training and testing purposes while rest were used for validation purpose.
- Effects of milling on nutritional profile of pearl millet and finger miller flours were determined.
- Storage study of Pusa Pearl Puff and Pusa Pearl Pasta was carried out.
- Cost economics of Pusa Pearl Puff worked out.

Specific Comments:

- i. The programme as well as presentation was not focussed and data is being generated without specific direction.
- ii. No new information is being generated. The various activities were depicted as achievements.
- iii. Capacity building an important aspect of the component is lacking. At least six training programmes should be conducted this year each of at least 10 persons. Efforts should be towards creating entrepreneurs.
- iv. The quality comparison with known brands is lacking.
- v. The programme be accomplished by March, 2016.

2. Farm Mechanization in Rainfed Agriculture (IGKV, Raipur). The report was presented by Dr Ajay Verma, PI.

Salient Achievements:

- ❖ Design and development of power operated single row paddy weeder.
- ❖ Design and development of power operated planter for dry and wet field condition.

- ❖ Establishment of manufacturing unit for developing entrepreneurship for manufacturing of farm equipment.
- ❖ Development and testing of inclined plate metering mechanism for rice.
- ❖ Development and testing of power tiller cage wheel for biasi operation

Specific Comments:

- i. The progress of the programme was appreciated.
- ii. The committee was of the view that all the equipments should be made available to the farmers.
- iii. The capacity building /training aspect was lacking in the programme.
- iv. The achievements should address the goal of enhancing cropping intensity, food production, employment etc.

Agriculture Education

- 3. Technology enhanced learning in agricultural education (NAARM, Hyderabad).** The achievements were presented by PI, Dr GR Murthy.

Salient Achievements:

- ❖ Baseline Investigation on the courses amenable for TEL in Agriculture Domain- A detailed study is performed using ‘Report of fourth deans committee on Agricultural Education in India’ to select the common/similar courses to be developed on MOOCs platform. (OUTPUT: Status paper on graduate level courses suitable for MOOC)
- ❖ Preliminary model development to host video based content on already standardized e-learning platform- MOODLE (OUTPUT: MOODLE site with MOOC format)
- ❖ Instrument to evaluate the perception of TEL by previous course developers (OUTPUT: Survey questionnaire)
- ❖ Standardization for storyboard writing for course preparation (OUTPUT: Storyboard template and Storyboard for model courses)

Specific Comments:

- i. Need to identify the client prior to content development.
- ii. Need to have strong linkage with e-courses developed under NAIP to have the continuity of the programme at National level with focus on capacity development
- iii. Compliance of the observations of the members of the internal review committee be ensured.

- 4. Management of soil health and productivity in ravinous land (RSKVV Gwalior).** The achievements were presented by the PI, Dr S. K. Verma.

Salient Achievements:

- ❖ Silvi- pastoral and crop production system and partially changed topography helped *in situ* water conservation and restored soil health. This is low cost and effective in checking ravine development
- ❖ The dynamic nature of nitrogen in such soils was studied.

- ❖ The project had contributed to human resource development (21 scientists trained), organized two workshops on management of such lands.
- ❖ The website of project Niche area of excellence. Org was launched in 2014-15.

Specific Comments:

- i. The presentation and documentation need improvement. The presentation of the data generated in response to the work done need to be given.
- ii. The achievements were not shown objective wise.
- iii. The map for the land earlier and after this work must be shown which was lacking.
- iv. System packages to be prepared for farmers use.
- v. The PI was asked to resubmit the revised report and make the presentation again in July, 2015.

5. Geo-informatics for natural resource management and precision farming (GBPUAT, Pantnagar). The achievements were presented by the PI, Dr. A. Nain.

Salient Achievements:

- ❖ Crop Simulation Models (DSSAT & Aquacrop) have been validated and calibrated on experimental data set.
- ❖ Development of Precision Farming Models using GIS and STCR approach based, ii) GIS+CSM based
- ❖ High resolution soil maps of Available Nitrogen, Available Phosphorous, and Available Potassium were created for Nainital district by taking more number of soil samples.
- ❖ Multivariate spectral model have been developed based on hyper spectral spectra to analyze soil variability
- ❖ Spectral Soil library of different soils series of Pantnagar region was created.
- ❖ An interactive system for Disease and Pest Monitoring and Management (DiPMS) has been developed. DiPMS has been configured to transmit plant images for pest and disease identification. Android and common mobile based applications (Apps) have been created to get information on pest and disease management
- ❖ Performance of yellow disease monitoring technique (developed during previous by integrating crop simulation model and remote sensing) year has been evaluated.
- ❖ An approach has been developed to generate high resolution soil moisture maps by involving SMOS data, LST and ground information.
- ❖ Environment Impact Assessment has been carried out by collecting ground water sampling through Perforated plastic pipes with plastic net.

Specific Comments:

- i. The progress of the programme was termed as satisfactory.
- ii. The programme must be strengthened with soil scientist to strengthen the work on land suitability analysis.
- iii. STCR and Precision Farming models need careful comparison.

6. Rain water management in rainfed agriculture (PDKV, Akola). The achievements were presented by the PI, Dr. S. M. Taley

Salient Achievements:

- ❖ Promoted the concept of adoption of mono-tier and two-tier systems of rain water management in saline tract of Purna river valley in 30,000 ha area through the network of 5500 farm ponds with the participation of 12,000 farmers.
- ❖ Promoted the concept of Rehabilitation of Drainage Network and desilting of the village tanks for strengthening the water resources in rainfed agriculture in 6 villages (Daryapur, Akot, Murtizapur and Akola tehsil) under the Govt. programme of Jalyukt Shivar Abhiyan in collaboration with the Revenue authorities.
- ❖ The half-moon terracing recommended for higher moisture conservation in medium deep soils.
- ❖ The 4th Degree Polynomial equations are recommended to predict the Erosion Index for 5, 10, 15, 30 and 60 min duration for Akola district.

Specific Comments:

- i. The progress of the programme was appreciated.
- ii. Work on land configuration to be strengthened.
- iii. Documentation needs strengthening.
- iv. Efforts should be towards wider coverage of the protocols developed.
- v. The same work should be demonstrated in Vidarbha region.

7. Production & protection technologies for potential vegetables and pulses under organic farming (CSKHPKV, Palampur). The report was presented by Dr. J P Saini, PI

Salient Achievements:

- ❖ Enrichment and fortification of composts and liquid manures
- ❖ Finalized package of practices w.r.t. nutrients, insect pests and disease management for the targeted crops
- ❖ Lantana dust and neembaan were most effective for the management of blister beetle in mash and flea beetle in okra crop.
- ❖ Aeration techniques applied in vermiwash (liquid manure) resulted in significant improvement of the beneficial microbial load over the non-aerated vermiwash and increased onion yield.
- ❖ In soil health study, it was observed that OC (%), dehydrogenase activity and soil microbial biomass carbon (SMBC) were significantly higher in organic treatments in comparison to inorganic treatments.
- ❖ Technology transfer through demonstration trials and FLDs at farmers fields.

Specific Comments:

- i. The presentation need focus and achievements be given as per objectives.
- ii. Complete package of practices and economics need to be worked out this year.
- iii. Capacity building was lacking in the programme.
- iv. The research programme need to be accomplished by March, 2016.

Concluding Session

The following were the major suggestions/recommendations:

- No deviation from objectives and technical programme be allowed by the Internal review Committee.
- The presentations be made as per objectives and outcome should be clearly defined.
- The facilities under Niche area be used for capacity building in the NARES system.
- Web-page should be developed by each centre.
- The funding of the Council may be acknowledged in all publications and products arising out of these programmes.
- Publication in high impact journals may be ensured.
- Any changes in the work plan or the man- power be not taken up without the approval of the Council.
- Annual reports to be submitted by the end of April every year.
- The products registration and patenting need to be taken up through IP&TM Unit of the ICAR. Each NAE centre may submit a note on potential patent applications (also other IPR applications). PIs to contact IP&TM Unit for required assistance. The technology and patented product may registered under the name of ICAR as per published guidelines rules of ICAR.

The meeting ended with the vote of thanks to Dr S. Ayyappan, secretary, DARE & DG, ICAR, including all other experts and scientists for their valuable suggestions by ADG (EP&HS).