

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

The X Annual Review Meeting of Niche Area of Excellence Programme was held on 2nd June, 2016 at Conference Facility, NAS Complex, New Delhi from 9.30 AM onwards under the chairmanship of Dr. Trilochan Mohapatra, Secretary DARE & DG, ICAR. The following experts and ICAR Officials participated:

- Dr. N S Rathore, DDG (Agricultural Education)
- Dr. NK Krishna Kumar, DDG (Horticultural Science)
- Dr. Jeet Singh Sandhu, DDG (Crop Science)
- Dr. H. Rahman, DDG (AS)
- Dr J.K. Jena, DDG (Fishery Science)
- Dr. M. P. Yadav, Former VC, SVBPUAT, Meerut
- Dr. Kusumakar Sharma, Former ADG (HRD), ICAR
- Dr. K. K. Vass, Former Director, CIFRI, Kolkata
- Dr. Bangali Baboo, Former ND, NAIP, ICAR
- Dr. Shibendu S Roy, Director, MNCFC, New Delhi
- Dr. A.P.Srivastava, Former NC, NAIP
- Dr. S.C.Dubey, Director, NBPGR
- Dr. D. K. Benbi, National Prof., PAU, Ludhiana
- Dr. C. N. Ravishankar, Pri. Sci., CIFT, Cochin
- Dr. B. S. Dwivedi, Head, SSAC, IARI, New Delhi
- Dr. A. K. Singh, Head, Division of genetics, IARI
- Dr. R. K. Thakur, PC, AICRP on Honey Bees & Pollinators, IARI
- Dr S.K. Chaudhary, ADG (SWM), NRM
- Dr P. K Chakrabarty, ADG (PP&B), Crop Science
- Dr. S. N. Jha, ADG (PE), Agril. Engg.
- Dr. MB Chetti, ADG (HRD)
- Dr. PS Pandey, ADG (EP & HS)
- Dr K.L Khurana, Pri. Sci., Education Division
- Dr Vanita Jain, Pri. Sci., Education Division
- Dr NidhiVerma, Pri. Sci., Education Division

At the outset, Dr. N S Rathore, DDG (Agricultural Edn), ICAR, welcomed the Chairman, invited experts, DDGs, other colleagues from Education Division and PIs and Co-PIs of all the NAE centres. 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 and capacity building. He emphasized that this was the programme with a mission and is one of the prestigious programme of the Education Division and ICAR. The major aim is to strengthen education for skilled human resource. By the time the programme is concluded the centre should be in a position to give a technology/product etc. for the stakeholders. He appreciated the programmes encouraging entrepreneurship. It was also informed that release of funds under plan scheme will be linked with accreditation of universities.

Dr PS Pandey, ADG (EP&HS) briefed the house about the achievements made under the programme by the various centres till date and raised the issues pertaining to Niche Area of Excellence and underlined the continuing importance of agricultural research, education and extension for sustaining and improving agricultural production with emphasis on strengthening higher education and capacity building. 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. T. Mohapatra, 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 need for the quantifiable yardsticks to measure the visibility attained by the centre. He appreciated and emphasized the importance of capacity building especially of students. Patents and technology commercialized is one of the important indicator's of success and all these technologies which are commercialized must be quantified in term of product sales and economic returns. 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 in high impact journals. He stressed the need for mid term review by internal committees so as to take proactive measures for the success of the programme. He stressed the need to integrate research with higher agricultural education i.e more number of students must be involved in research under Niche Area being supported at the university. He informed that ICAR will encourage and support the areas which have success stories to their credit for greater vigor.

The inaugural session was followed by three technical sessions spread over entire day wherein the programme-wise salient achievements for the year 2015-16 and technical programme for the year 2016-17 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

Eightprogrammes 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. Udaya kumar presented the salient achievements.

Salient Achievements:

- Multigene groundnut transgenics co-expressing Alfin1:HSF4A:PDH45 (events such as M17, M30, M40, M86, M97, M99, M100 & M104) are promising and showed 23-27% improved productivity.
- KMP175, a superior rice cultivar developed as an outcome of the physiological breeding programme combining root and WUE traits has been released for cultivation in water limited southern dry zone-6 of Karnataka state.
- Root and WUE QTLs were introgressed into mega variety IR64. Rice transgenics expressing regulatory genes to improve cellular tolerance mechanisms are productive under stress,
- Functional characterization of *EcTAF6* involved in transcription process and AKRs involved in carbonyl stress indicates their importance in imparting stress tolerance.

- Non-invasing techniques to assess the plant water status using field spec standardized.

Specific comments

- The expert committee appreciated the progress of the programme.
- The centre must share developed lines in groundnut and rice among the other expert groups. The group should associate with scientists from IIRR, Hyderabad, CRRI, Cuttack and DGR, Junagadh and other institutes working in this area for further characterization and advancement.
- Promising trait introgressed rice line KMP-175 developed, is being released for zone-6 of Karnataka, trials in other zones with climatic conditions similar to the zone 6 of Karnataka, the centre may provide agro-meteorological features of this zone-6.
- Actual yield potential of the transgenics and trait introgressed events may be provided in the reports besides the percent increase in yield over the wild type.
- Drought effect of on quality of the produce may be assessed in the promising material that is being generated in groundnut and rice.
- Additional support as per the need may be provided to complete the phenomic facility.

2. Exploitation of microbial and genomic resources for plant disease management (UAS, Dharwad). The PI, Dr Sumangala Bhat, made the presentation.

Salient Achievements:

- Plants inoculated with AUDT502 + *Ralstoniasolanacearum* showed 90% disease control.
- Three promising isolates (AUDT 626, AUDT699 and AUDT693) were selected for the evaluation of control of *Fusariumoxysporum*f.sp. *lycopersici* in tomato under green house conditions.
- Twenty per cent reduction in stem rot disease of groundnut caused by *S. rolfsii* by AUDT 673 treatment.
- CFE 62(b) has reduced the wilting caused in bacterial wilt disease (*Ralstoniasolanacearum*) in brinjal by 46.7%
- A metagenomic library of garden soil was constructed comprising of 30,000 clones.7742clones were screenedagainst *R. solanacearum* and *Xanthomonasaxanopodis*; 3180 clones were screenedagainst *R. solani*, *S. rolfsii*, *Fusariumsolani*; while 7456 clones screened forphosphate solubilisation and hydrolysis of colloidal chitin

Specific comments

- The characterised microbes be deposited in the national facility viz. NAIMCC, at ICAR-NBAIM, Mau.
- Expectations from this programme werevery high and the university without informing the Council, transferred the PI, thereby affecting the progress of the programme. The committee took a serious view of this and decided the no further proposals from UAS, Dharwad will be entertained under Niche Area of Excellence.
- As the programme is concluded, PI may submit printed copies (10 copies) of the final report after incorporating the suggestions of the experts.

3. 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 N S Bains and Dr Kuldeep Singh, PIs for the wheat and rice components, respectively.

Salient Achievements:

- Large number (>10,000) of advanced introgression material generated using European winter wheat evaluated
- Gene scouting for stripe and leaf rust resistance from European winter wheats: inheritance confirmed and marker analysis in progress in six donors
- Lab and field evaluation of marker assisted combinations of dwarfing gene *Rht8* (relevant under drought stress and zero tillage conditions) from two winter wheat donors with *Rht2* in wheat cultivars PBW 621 and HD2967
- Exploration of the European winter wheats for generation of a diversified set of fertility restorers (BC₁F₃ and F₄) for development of hybrid wheat varieties.
- Trait for high grain weight transferred from selected *Ae. tauschii* accessions to bread wheat varieties PBW 550 and PBW 621. QTL for grain weight, length and width have been identified.
- Generation and utilization of several new synthetic hexaploid wheats and development of an improved protocol for direct gene transfer from *Aegilopstauschii* to bread wheat.
- Resistance to stripe rust and Karnal bunt identified in triticales x bread wheat derivatives and their transfer into high yielding bread wheat lines is underway.
- Molecular mapping of bacterial blight resistance gene from *O. rufipogon* IRGC 93216 on rice chromosome 4.
- Molecular mapping of BPH resistance genes from *O. nivara* accessions IRGC 104646 and CR 100204 under progress on F₃ progenies.
- The amphiploids (PR122/*O. punctata* IRGC105137) generated in previous year backcrossed with the rice cultivars to harness and transfer the weed competitive and productivity traits of *O. punctata*

Specific comments

- i. The progress was appreciated.
- ii. The material generated under the programme to be made available for breeding programme nationally and share the vast amount of material generated with different Institutes.
- iii. As the programme is concluded, the submission of final report should be as per the format and PI may submit printed copies (10 copies) of the final report after incorporating the suggestions of the experts.

4. Capacity building in taxonomy of insects and mites (UAS, Bangalore). The achievements of the programme were presented by the Dr. B.M. Mallik

Salient Achievements:

- Checklist of Potter wasps (Hymenoptera: Vespoidea: Eumeninae) of south India is prepared
- Reported two new species and a new record of *Bactrocera* Macquart (Diptera, Tephritidae: Dacinae: Dacini) from India
- Recorded new species of spider mites (Acari: Tetranychidae) from India with new records and redescription of species
- The ITS2 sequence of seven species of mites and two species of Coccinellidae, and COI sequence of two species of fruit flies have been deposited in NCBI gene bank during 2015-16.
- Conducted six capacity building programmes leading to capacity building of 100 faculty, students and other officials from agriculture department.

Specific comments

- i. The importance of the work in area was appreciated, however, digitization of the keys as proposed in objectives may be initiated.
- ii. Molecular systematics need to be strengthened.
- iii. All the information should be available on the web site also. Digital Keys to be developed.
- iv. Training programmes on Ticks, mites fleas and other blood sucking groups may be included and veterinarians to be trained. Taxonomy training on fruit flies which are of national importance
- v. University must support the facilities created under the programme Centre to keep track of the parameter of success, i.e. after training how many universities are able to offer the course in insect taxonomy.
- vi. Co PIs to be identified by the PI.

5. Exploration & exploitation of *Trichoderma* antagonist against soil borne pathogens (CSAUA&T, Kanpur). The presentation was by the Co PI, Dr Pratibha Sharma.

Salient Achievements:

- *T. harzianum* (*Th. azad*) followed by *T. viride* (01PP) recorded the highest inhibitory effect against most of the soil borne pathogens.
- *T. harzianum* resisted temperature up to 50°C for 8 hours (2×10^6).
- Seed bioprimering with 5% formulation of *T. harzianum* and *T. viride* gave better germination with decreased mortality.
- Maximum hydrolytic enzyme (chitinolytic activity) produced by *T. aggressivum* out of eighteen species tested.
- Maximum secondary metabolites (91.2%) found in *T. harzianum* associated with phytopathogenic action.
- 151 peptides analysed through MALDI ToF belonged to the glucanase enzyme & are involved in the interaction of bioagent with the pathogen.
- Novel method for preparation of *Trichoderma* formulation using colloidal chitin in fermentor Pure spore harvesting methodology standardized
- Cheapest medium for quantitative isolation of microbes standardized
- *T. harzianum* strain registered under 9(3) B from CIB and license for commercial production obtained from the state Government.

Specific comments

- i. The experts took a very serious view of the absence of PI during the meeting.
- ii. As statistical analysis was missing in the presentation and controls were not defined in the presentation the experts desired that PI should come to make the presentation.
- iii. The centre was asked to complete the work, compile and submit the final report and deposit the material with the Bureau, ICAR-NBAIM, Mau.
- iv. As the programme is concluded, PI may submit printed copies (10 copies) of the final report after incorporating the suggestions of the experts.

6. Pollination management research in apples and other fruits in Kashmir valley (SKAUST-Kashmir). The achievements were presented by Dr M. Parray.

Salient Achievements:

- 44 species of pollinators identified, **Most promising were** :*Lassioglossum marginatum*, *Apis cerana*, *Apis mellifera*, *Xylocopa* spp., *Andrena* spp., Syrphids

- Developed technologies for habitat management of native bees by installing wooden blocks and stem bundles in apple orchards of 3.0 hectares of Shopian and Budgam districts of Kashmir valley.
- Floral Calendar has been developed for 141 plants and identified 29 species of floral plants exhibiting synchronization with apple bloom and thereby interfering pollination in apple
- Pollination deficit surveys in Kashmir Valley revealed that 78 % apple trees experience 80-40 % pollination deficit

Specific comments:

- i. The progress of the programme was satisfactory, and the work in the area of pollination was appreciated.
- ii. Since it is an important area the work should have resulted in a road map for farmers.
- iii. Increase in yield to be quantified as a result of pollinizers and should be reflected in final report.
- iv. PI may interact PC, AICRP on Honey Bees & Pollinators.
- v. As the programme is concluded, PI may submit printed copies (10 copies) of the final report after incorporating the suggestions of the experts.

7. Genetic improvement of Kinnow mandarin for fruit quality, biotic and abiotic stress tolerance (PAU, Ludhiana). The achievements were presented by Dr. P.K. Arora

Salient Achievements:

- Colchicine dose for tetraploid production is being standardized.
- A total of 448 flowers were crossed in the cross: 'Kinnow' (♀) x 'MukakuKishu' (♂) of which 201 flowers set fruits and 61 of which had reached harvesting or have been utilized for embryo culture.
- In the cross of 'Mukaku Kishu' (♀) x 'Kinnow' (♂), embryos were not observed in the seeds.
- In Jatti Khatti x Sour orange cross, the retained fruits include those which were either used for seedsowing in seedling trays or were utilized for embryo culture.
- Ideal days interval for rescuing the zygotic embryo standardized.
- Standardized the levels of salinity for screening of hybrids.
- The samples are being collected from citrus growing blocks of Fazilka district for *Phytophthora* isolation.
- Budding, patch budding, tongue grafting and wedge grafting were used for advanced evaluation of fruits in hybrids. Maximum budding success (35.0 %) was obtained in wedge grafting.

Specific Comments:

- i. The centre must be specific about the variety being used for the experiments.
- ii. The objectives 4&5 may be merged and centre may submit the revised objective.
- iii. The potential of Alemow and Rangpur lime should also be explored as breeding parent.

8. Crop regulation for increasing productivity of alphonso mango under climatic condition in Konkan region (Dr. BSKVV, Dapoli). The achievements were presented by Dr. P.M. Haldankar.

Salient Achievements:

- The programme was sanctioned recently, hence achievements were not given

Specific Comments:

- i. Since the work is on mango the centre was advised to remove the word mango from the objectives.
- ii. The PI was advised to associate with Dr. Ravindra of IIHR and Dr Udaykumar of UAS, Bangalore to realign the objectives and submit the revised objectives after discussion.
- iii. The last objective may be removed since the technology to manage spongy tissue is already available.
- iv. Role of boron in mango fruiting may be included in the programme.

Technical Session II**Agriculture Engineering, Agricultural Education & Natural Resource Management**

The seven programmes were presented and discussed in this session

9. 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**

- Nine carrot and 10 capsicum varieties/germplasms were screened for antioxidant, phenolics and other traits.
- Vitamin C (14 mg/100g) enriched RTE snack was developed for children (6-16 years) using maize-rice-aonla (80:10:10) blend with acceptable organoleptic quality.
- Incorporation of fenugreek powder (0.5-3%) on extruded snack from sorghum resulted in increase in the functionality of extruded sorghum snack for developing low glycemic food for diabetic people.
- Extruded reconstituted rice as convenient product (cooking time ~4 min) was developed with improved protein quality.
- Evaluation of extrusion characteristics of barnyard millet, rice, wheat and maize was carried out with barrel temperature, screw speed, feed moisture content and feeder: screw speed as independent variables.
- Developed two-layer feed-forward fully connected neural network model for predicting extruded product quality.

Specific Comments:

- i. Checking for bioavailability of nutrients is must for validated statements
- ii. No product fortified with capsicum has been developed
- iii. The PI was advised not to include the activities other than approved objectives.
- iv. The quality comparison with known brands is lacking.
- v. As the programme is concluded, PI may submit printed copies (10 copies) of the final report after incorporating the suggestions of the experts.

10. Farm Mechanization in Rainfed Agriculture (IGKV, Raipur). The report was presented by Dr Ajay Verma, PI.**Salient Achievements:**

- The cage wheels for *Biasi*operation were optimized for *Inceptisols* and *vertisols* soil.
- Direct dry row seeding in rice was found more suitable under rainfed conditions.
- The inclined plate seed metering machine field tested in 5.1 ha area in research farm and 14 ha in farmer's field.
- Gender neutral rotary single row power rice weeder developed.

- The conservation agriculture technologies such as Zero tillage were demonstrated for chickpea (50 ha), linseed (5 ha) and mustard (10 ha), Intercrop seed drill (5 ha), inclined plate planter for maize planting (450 ha), pigeon pea (8ha), Chickpea (150 ha), sunflower (20 ha) covering as many as 300 farmers.

Specific Comments:

- i. The progress of the programme was satisfactory.
- ii. The achievements should address the goal of enhancing cropping intensity, food production, employment etc. and same should be reflected in final report.
- iii. As the programme is concluded, PI may submit printed copies (10 copies) of the final report after incorporating the suggestions of the experts.

11. Technology enhanced learning in agricultural education (NAARM, Hyderabad). The achievements were presented by PI, Dr G R Murthy.

Salient Achievements:

- Establishment of model TEL Lab at NAARM with high end production equipment integrating hardware and software resources and 3 Mini Labs at PJTSAU, TANUVAS, DRNVJIRD.
- An interactive e-learning website with different course categories viz. residential courses, distance education courses, MOOC and other vocational courses established.
- Integration of outputs and infrastructure for all institute mandated capacity building programmes to conduct exercises like ‘**Microteaching**’, ‘**Oral communication**’ sessions.
- Live contact sessions for distance education course on PGDTMA (I and II semester) using A-VIEW.
- A unique approach of MOOC on MOODLE for a course titled “Competency Enhancement through Microteaching Methodology” with 318 users.

Specific Comments:

- i. Progress of the programme was appreciated.
- ii. Centre must ensure that facilities developed are adopted by the universities.
- iii. Uniformity and quality of the content needs to be maintained.

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

Salient Achievements:

- Prepared maps on extent of ravine area in different district of Gird Zone i.e. Morena, Bhind, Gwalior, Sheopur and Datia and observed that ravine area in gird region is decreasing due to the shallow and medium ravines used for agriculture purpose.
- The Chambal ravine developed in following four stages pothole stage, tunneling stage, collapsing stage and recession stage.
- The modified gabion structure was found most suitable to check soil erosion. The total soil stored against the improved gabion was 1204 tons/ ha.
- The five modules i.e. Diversified cropping, Agri-horti, Horti-Medicinal, silvi-medicinal and silvi-pastoral modules was studied for soil conservation carbon sequestration, biomass carbon.
- The most suitable module was agri-horti followed by silvi-pastoral for soil conservation.

- Total 17 types of plants were planted in the experiment area under different modules.
- The organic carbon which was just 0.11- 0.12 % at start of experiment is at 0.30 to 0.35% under various modules in surface soil.

Specific Comments:

- The presentation and documentation need improvement. The impact of the work needs to be included.
- It is observed that impact is not included and economics are also not worked out. Further, there is no novelty in the programme and it is a routine agronomy work.
- Data on NPK values and micronutrients to be included in the extended phase.
- The achievements to be shown objective wise.
- System packages to be prepared for farmers use.
- As the programme is concluded, PI may submit printed copies (10 copies) of the final report after incorporating the suggestions of the experts.
- Since management of ravenous land is national problem experts recommended extension for two years, i.e. upto March, 2018, and PI was advised to discuss with SMD and submit the extension proposal, accordingly.

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

Salient Achievements:

- Cropping Systems of US Nagar and Nainital Districts were evaluated using crop simulation model and geospatial Technology.
- The management practices for existing cropping systems were optimized.
- The maps of available N, P, K and organic matter were generated using hyperspectral models.
- Uttarakhand Soil Information System has been made more user friendly. USIS is being used by farmers for applying fertilizers in the field as there are more than 5000 hits at this web page.
- DiPMMS system has been made fully operational. The database related to all major diseases and pests of wheat and rice crop has been updated / created.
- A web based Agriculture Expert System (AES) was designed and developed for advising farmers for managing threat of yellow rust disease in wheat.
- The STCR and geospatial technology based model of precision farming has been demonstrated at three different Farmer's field of US Nagar.
- Analysis of ground water suggests Precision Farming could reduce almost 10% load of nitrates in the ground water.

Specific Comments:

- The progress of the programme was termed as satisfactory, however, experts expressed concern on non-adherence of the PI to time limit.
- The experts felt that the presentation lacked focus and there were too many achievements.
- A precision models should have been developed.
- Conclusions should be specific and clear.
- The centre should define clearly outcomes and output.
- Final report to be submitted by the centre as the programme was concluded in March, 2016.
- The committee recommended extension of programme for two years i.e upto March 2018 for monitoring and management of diseases and to assess the impact of precision farming and capacity building in the area. The centre may submit the extension proposal, accordingly.

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

Salient Achievements:

- Adoption of the mono-tier and two-tier system of rainwater management on more than 55,000 ha area through the network of 10,500 farm ponds by about 35,000 farmers in Vidarbha region.
- Out of 250km length rivulets in Akot and Telhara tehsils of Akola district, the deepening and widening upto 44.5km has been carried out and recycled 12.5 lakh m³ of silt in 1080 ha area with avg. layer of 10-12cm by 340 farmers in participatory mode under Jalayukt Shivar Abhiyan.
- Village Ramagad and Nardoda (Dist. Amravati) are developed as Model villages for rainwater management in rainfed agriculture.
- Hydrogeomorphometric study of the Akola district using remote Sensing Technique is carried out.
- Two technologies/recommendations proposed for Joint AGRESCO on sub-surface tillage and contour ridges and furrows.

Specific Comments:

- i. The progress of the programme was appreciated.
- ii. Documentation needs strengthening.
- iii. Efforts should be made towards wider coverage of the protocols developed.
- iv. The same work should be demonstrated in Vidarbha region as well.
- v. As the programme is concluded, PI may submit printed copies (10 copies) of the final report after incorporating the suggestions of the experts.

15. 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:

- Standardization of nutrient management in soyabean under organic cultivation.
- Neem oil (Neembaan), neem seed kernel extract 5% and the aqueous extract of *Lantana* 5% for the effective management Bean bug & soybean bug.
- Maximum control of *Cercospora* leaf spot disease observed in *Tamarlasi*
- In Mash Blister beetle (*Mylabrisp*) 100%, Bean bug (*Riptortus* sp.), *Cercospora* leaf spot up to 57.6% controlled without use of synthetic pesticides.
- In Gram treatment for maximum yield under organic cultivation standardised.
- In vegetables like okra, pea and potato nutrient management, yield and disease management through organic cultivation.
- *Panchgavya* at 10 % dilution was found most effective **against many test pathogens** i.e. *Fusariumsolani*, *Fusariumoxysporum*, *Rhizoctoniasolani*, *Sclerotiniasclerotiorum*, *Alternariabrassicae* (> 30 % mycelial inhibition). *Tamarlasi* gave 100% mycelial inhibition against *Rhizoctoniabataticola*.

Specific Comments:

- i. Complete package of practices and economics need to be worked out during this year.
- ii. The centre must analyse the quality of produce.
- iii. Units for all the parameters to be included in the final report
- iv. Analysis of different composts to be included in the report.
- v. Composition of the material to be included in the final report.
- vi. The programme may be extended for one year i.e till March 2017 to enable the centre to come out with package of practices for some vegetable crops. There will be no additional financial liability on the Council.

Technical session III Animal & Fishery Sciences

Twelve programmes under Animal sciences and two under Fishery Sciences were presented and discussed.

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

Salient Achievements:

- *Janthinobacterium*, a specific spoilage organism, was isolated and reported for the first time from Indian squid.
- Biofilm forming *Listeria monocytogenes* was first isolated from seafood contact surfaces of East Coast of India.
- Two technologies developed were released by the University.
- Four gene bank accession numbers were obtained.

Specific Comments:

- i. The committee stressed on the need for validation of freshwater indicators, formalin kit and ammonia as quality index method.
- ii. The report must explain the advantage and innovation in use of AFLP markers for detection of Tuna.
- iii. The centre may identify the key elements and safety aspects of the nation as a whole.

17. 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:

- Established a fish disease diagnostic laboratory for Level 3 diagnosis in Kolkata
- Documented the prevalence of Transboundary Aquatic Animal Diseases (TAAD) such as WSV, CyHV2, CyHV3, lymphocystis, EUS and streptococosis in West Bengal
- First outbreak report of Cyprinid herpes virus-2 (CyHV2) disease in ornamental *Carassius auratus* aquaculture farms in West Bengal, India
- Identified the relative risk, putative and sparing factors that induce infectious diseases in carps and catfish for ecofriendly interventions and for the development of better management practices
- Developed Dot ELISA for the detection of fish pathogens, *E. tarda* and *A. hydrophila*
- Standardized the multiplex PCR technique for simultaneous detection of *E. tarda* and *A. hydrophila* infection
- Standardized the PCR detection of fish pathogens by culture independent metagenomic approach
- Developed an outer membrane protein vaccine for *E. tarda*.

Specific Comments:

- i. Preventive measures for the diseases wherever applicable should be included in report.
- ii. The PI was suggested to explore the ways to sustain the programme in future.
- iii. As the programme is concluded, PI may submit printed copies (10 copies) of the final report after incorporating the suggestions of the experts.

18. 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:

- Fine mapping of 4G6 PPRV monoclonal antibody epitope done
- Developed bead based immunoassay(s) using recombinant proteins for sero-diagnosis of PPR
- Two recombinant proteins of Brucella [P-39, OMP-31] were purified for developing biosensor assay
- Three recombinant proteins of PPRV [H, F and M] are expressed, upscaled and purified for developing biosensor assay
- Protein specific antibodies of recombinant MMP2 protein of dog were immobilized on SPR sensor chip surface to detect Canine Mammary Tumour (CMT) associated biomarker protein (MMP2) in dog serum samples.
- Protein specific antibodies of recombinant BIRC5 protein (*Survivin*) of dog were immobilized on SPR sensor chip surface and CMT associated biomarker protein (BIRC5) was detected in dog serum samples.

Specific Comments:

- i. The progress of the work was appreciated.
- ii. The results of biosensor based assays may be compared with standard methodologies
- iii. The scope of work on biosensor based diagnostics may be expanded further to include other disease models. Efforts to be made to develop user-friendly diagnostic biosensor method.
- iv. The experts were of the opinion that excellent research facilities are generated under the programme and this Centre to be developed as a **Facility for Research & Training on Biosensors** to train the faculty and students for sustained use of infrastructure, expertise and facilities; even after completion of project.
- v. It was suggested to conduct structured training in the area of biosensors for the benefit of faculty and students.
- vi. The team should come up with a training manual incorporating the time tested protocols on biosensor research.
- vii. Appropriate budget provision for the training component to be made for F/Y 2016-17
- viii. The programme was sanctioned from 22nd September, 2011 for 5 years i.e till September, 2016, with financial approval up to 31st March, 2016; therefore, the PI has requested to accord financial sanction for the programme duration for six months to complete the approved activities.

19. Spore based sensor for monitoring pesticide residues in milk (NDRI, Karnal). The programme achievements were presented by PI, Dr Naresh Kumar

Salient Achievements:

- Spore enzyme based sensor on paper strip was optimised for solvent volume 0.5 ml required for extraction of pesticide from food matrix.
- The spore enzyme based sensor on paper strip was evaluated for LODs for different groups of pesticides.
- Replacement of clean up reagents with filtration technique using specialized filter tips.
- Detection of pesticide successful using spore based sensor on paper strip.
- The spore enzyme assay was miniaturized on paper strip by functionalization of specific

enzyme substrate using LHS / Easy printer machine and its stability / functional working under storage at 25±5°C was achieved upto 8 months without any impact on color development, sensitivity/LOD and reproducibility of strip based assay.

- The spore enzyme assay was also evaluated on biochip.

Specific Comments

- i. The progress of the programme was considered to be satisfactory.
- ii. The expert committee recommended the programmable cutter machine for cutting paper strips.

20. Animal disease registry and tissue bank (WBUFAS, Kolkata). The presentation was made by the PI, Dr. J D Ghosh.

Salient Achievements:

- The sensitivity, specificity and accuracy of microscopy in diagnosis of CVBDs were: 84.12%, 81.44% and 81.33% for *B. gibsoni*, 19.44%, 94.73% and 76.67% for *E. canis*, 35.7%, 100% and 94% for *H. canis* and 100%, 82.1% and 84% for *Haemobartonellacanis*, respectively with PCR.
- Commercial kit based on Immuno-chromatography for *E. canis* the sensitivity, specificity and accuracy of microscopic diagnosis were 16.7%, 96.6% and 82.9%, respectively.
- Among the canine vector borne diseases (CVBD) highest incidence (42%) was recorded for *Babesiagibsoni*.
- Adult dogs revealed higher rate of incidence (32.7%) of canine vector borne diseases/infections compared to those of the younger age groups and infections more in females
- Mixed infection with two or more protozoan/rickettsial pathogens was predominant amongst the canine vector-borne diseases.
- Ten out of 25 faecal samples of chronic diarrhoeic cattle were detected positive for acid-fast bacilli. Molecular characterization of the organisms is under process.
- Format for disease registry of the project has been developed for recording the data and their digitization.

Specific Comments

- i. Serious concern was expressed over very small number of animals tested out of huge animal population of state during the tenure of the project.
- ii. The centre was advised to deposit all the materials generated till date in VTCC, Hisar, digitize the resources generated.
- iii. As the programme is concluded, PI may submit printed copies (10 copies) of the final report after incorporating the suggestions of the experts.

21. Animal disease registry and tissue bank (GADVASU, Ludhiana). The achievements were presented by the PI, Dr. N. S. Sharma.

Salient Achievements:

- Antibiotic sensitivity to ampicillin, amoxicillin and penicillin varied greatly in mastitis.
- Higher number of corynebacteria at dairy farms following practice of machine milking.
- Multidrug resistance acquired by *S. aureus*, in case of clinical isolates.
- Supplementation of propylene glycol @200ml/day/animal to the subclinical ketotic cows, improved milk yield.
- Concentrations of NEFA, BHBA and activities of AST, ALP, GGT, LDH, and GDH activities were increased in parturient dairy cows developing hepatic lipidosis.

- **Canine Parvovirus** The most prevailing antigenic type in the samples tested by Real-Time PCR and gene sequencing was CPV-2a.
- **Canine distemper** Maximum genetic/antigenic variation were observed for H and F proteins than M and P proteins of Indian wild-type CDV.
- Blood PCR was found to be most sensitive assay in clinical cases of **Johne's disease**
- **Renal failure in dogs:** Maximum dogs with CRF had anemia, melena, vomiting and poor body condition. Treatment with ACE-inhibitors and phosphate binders helps in management of dogs with CRF, by reducing hypertension, hyperphosphatemia and proteinuria. Management of CRF with renal diet is an essential method to control progression of chronic kidney disease and prolong survival of these dogs.
- The cases of diseases were diagnosed and their tissue blocks, H & E stained slides, special stained slides and non stained paraffin sections have been preserved.

Specific Comments

- i. The progress was satisfactory.
- ii. Digitization of the resources generated should be made.
- iii. Publications mentioned were not specific to the programme.
- iv. As the programme is concluded, PI may submit printed copies (10 copies) of the final report after incorporating the suggestions of the experts.

22. Animal disease registry and tissue bank (KVAFSU, Bidar). The presentation was by PI, Dr HD Narayanswamy.

Salient Achievements:

- Hematobiochemical studies of Canine Parvo viral disease were conducted and phylogenetic analysis revealed CPV2a and CPV 2c isolates.
- Phylogenetic analysis revealed prevalence of *E.canis* in **Canine Ehrlichiosis**
- **Paratuberculosis** : The study revealed the presence of 'Indian Bison type' in the sheep population of South India for the first time.
- Haematobiochemical & Immunohistochemical studies were conducted for Canine Cancer.
- **Canine Babesiosis:** prevalence of *Babesiacanis* and *Babesiagibsoni* infection was confirmed.
- **Bovine Mastitis:** Pathomorphological changes of mammary gland was studied and Multiplex PCR was standardised.
- Occurrence of renal failure in dogs was documented.

Specific Comments

- i. The centre was advised to deposit all the materials generated till date in VTCC, Hisar, and digitize the resources generated.
- ii. As the programme is concluded, PI may submit printed copies (10 copies) of the final report after incorporating the suggestions of the experts.

23. Centre for Zoonoses (MAFSU, Nagpur). The presentation was by PI, Dr. Sandeep P. Chaudhary

Salient Achievements:

- The serological assay for screening included in-house developed listeriolysin O (LLO) based ELISA for Listeriosis which detected 15.73 per-cent antibodies to LLO (ALLO). The lipopolysaccharide (LPS) based ELISA for brucellosis detected antibodies in 13.12 per cent animals.

- The human samples had seropositivity for *Listeria monocytogenes*., ALLO (4.9 per cent), *Brucella* (Anti-LPS antibodies) (5.22 per cent)
- The outbreak cases of *Leptospira* from Mumbai confirmed 55.26 per cent seropositivity among animals by MAT, whereas, 98.27 per cent from Chiplun episode.
- Among the human suspected cases 92.30 per cent positivity for leptospirosis was reported by MAT.
- *Listeria monocytogenes* was isolated from four while *Brucella* organism could be isolated from four (*B. abortus* in two while *B. melitensis* in another two) clinical samples.
- The blood PCR revealed 0.5 per cent prevalence of *Leptospira*, 1.65 per cent prevalence of *Listeria monocytogenes*, 1.71 per cent of tuberculosis and 4.28 per cent of brucellosis among animals.
- The case of tuberculosis as reverse zoonoses was also confirmed in collaboration with CIIMS, Nagpur

Specific Comments:

- The progress of the programme was appreciated.
- As lot of objectives need to be covered in the programme and programme was sanctioned in March, 2015, the programme may be extended up to 2017-18.
- Emphasis should be on capacity building by organizing trainings.

24. Study of *Clostridium perfringens* and *Dichelobacternodosus* (SKUAST, Kashmir). The presentation was by PI, Dr. S.A. Wani.

Salient Achievements:

- A total of 105 flocks comprising of 3312 sheep in 8 different districts of Jammu & Kashmir were inspected.
- A total of 344 faecal samples from 149 adult sheep (healthy 142, diarrhoeic 7) and 195 lambs (healthy=138, diarrhoeic 57) were collected for isolation of *Clostridium perfringens*.
- Out of 3312 sheep 525 sheep (15.85%) were found to be affected with footrot and a total of 239 representative samples were collected.
- *Clostridium perfringens* was isolated from 76 samples (51%)

Specific Comments:

- (i) The progress of the work under this programme was appreciated.

25. Wild life forensics and health (NDVSU, Jabalpur). The presentation was by PI, Dr. AB Srivastava.

Salient Achievements:

- Sequenced and submitted whole genome of Domestic Pig using NGS to the NCBI database.
- Species identification from biological samples such as dried blood
- Developed SNP markers of 12sr RNA and Cytochrome b gene in wild herbivores (13 species) of Madhya Pradesh.
- Developed species specific primers for identification of Indian Wild Pig (*Sus scrofa cristatus*) differentiating it from (n=17) pig races of world and filed patent for the primer which is being regularly used to identify wild pig from forensic samples submitted for investigations by Madhya Pradesh forest department.
- 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.
- Standardized techniques for evaluation of hepatic and renal disorders in wild felids using Ultrasonography.
- Treated and participated in operations for radio collaring and translocation of tigers in different tiger reserves of Madhya Pradesh.

Specific Comments:

- i. The progress was considered satisfactory.
- ii. The centre must conduct capacity building programmes
- iii. Work should be initiated under vertebrate pest management.

26. Metagenomic analysis of ruminal microbes (AAU, Anand). The achievements of the programme were presented by the PI, Dr. C. G. Joshi.

Salient Achievements:

- Shotgun sequencing, 16S amplicon sequencing and Metatranscriptome sequencing of rumen metagenome as well as 16S amplicon sequencing of fecal metagenome of 48 samples of Mehsani buffalo, 48 samples of Kankrej cattle, 48 samples of Gir cattle, 48 samples of Jaffrabadi buffalo, Surati buffalo
- Amplicon study of rumen metagenome of 19 samples [zero day to 6 months (interval of 15 days) and 6th to 9th month (interval of 30 days)]
- Identification and characterization of 2 cellulase, 1 multifunctional and 1 phytase recombinant clones

Specific Comments:

- i. The progress of the programme was appreciated.
- ii. As the programme is concluded, PI may submit printed copies (10 copies) of the final report after incorporating the suggestions of the experts.

27. Nutrition and gut health; probiotics, prebiotics and phytogetic as functional foods to augment gut health of dogs (IVRI, Izzatnagar). The achievements were presented by PI, Dr. A.K. Patnaik.

Salient Achievements:

- Developed a method for laboratory scale production of inulin from Jerusalem artichoke
- Dietary supplementation pomegranate peel extract (as a source of polyphenols) found effective in alleviating DSS-induced colitis in rat model
- Supplementation of *Lactobacillus johnsonii* CPN23 improved the resilience of the experimental rats towards the protection against DSS-induced colitis
- Developed a synbiotic containing *Lactobacillus johnsonii* CPN23 and Jerusalem artichoke; initial testing indicates its potential application in dogs to augment gut health

Specific Comments:

- i. The progress by the centre was appreciated.
- ii. The committee was of the view that since centre was doing good work the funds for the equipments may be released as these could not be utilized earlier, as this is the only lab in the country on pet nutrition with focus on clinical nutrition.

28. **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 NDV, IBV and IBDV
- Molecular epidemiological data for NDV, IBDV, IBV and CAV
- Adaptation of CAV, IB, NDV and IBDV to cell culture
- Immunization studies with cell lineadapted NDV genotypes II, IV and XIII
- LAMP assay for IBV and Recombinant TK antigen based LAT for DPV
- LAMP assay for IBDV
- RNA sequencing and Transcriptome analysis of NDV
- Computational homology modelling of proteins of avian TLR 3 and TLR 7
- Differential inflammatory cytokine responses between duck and chicken
- Pathotyping facility for NDV and genotyping facility for IBV
- Multiplex PCR for differentiating MDV, Avian leucosis complex virus and REV

Specific Comments:

- i. The work done by the Centre was appreciated.
- ii. The centre must highlight the work done for the poultry industry.
- iii. As the programme is concluded, PI may submit printed copies (10 copies) of the final report after incorporating the suggestions of the experts.

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

Salient Achievements:

- Existence of *beta3*-adrenoceptor in buffalo myometrium was reported for first time in buffalo myometrium.
- *beta3*-adrenoceptor coupled with K_{ATP} and BK_{Ca} channels to mediate tocolytic effect in buffalo myometrium.
- Depletion of cholesterol by methyl β -cyclodextrin attenuated K_{ATP} channel mediated relaxation
- Acetylcholine (ACh) produced endothelium-dependent relaxant effect on uterine arterial rings in both non-pregnant and pregnant buffaloes.
- Hydrogen sulphide (H_2S) modulated uterine myogenic activity in buffalo myometrium.

Specific Comments:

- i. The progress of the programme was satisfactory.
- ii. The focus should be bovines in real life situations.
- iii. As the programme is concluded, PI may submit printed copies (10 copies) of the final report after incorporating the suggestions of the experts.

Concluding Session

The following were the major suggestions/recommendations:

- The highlights of the programme along with outcome in quantifiable terms to be presented.
- Hence focused slides are to be presented. The presentations may be submitted to the Education Division at least three days before the meeting.
- The monitorable indicators to be defined with base line in quantifiable terms.

- Way forward after the conclusion of the programme to be indicated.
- Internal review for all the centres must be completed by September every year and minutes should be submitted to the Council, otherwise further release will be withheld.
- 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. Some of the centres are yet to develop the web page for Niche Area of Excellence.
- The funding from the Council must be acknowledged in all publications, technologies, products and patents arising out of these programmes.
- The products registration and patenting need to be taken up through IP&TM Unit of the ICAR.
- Publications in high impact journals may be ensured.
- Each centre should submit half yearly report by September 30th every year.
- The centre must publish at least one publication in NAAS rated journal above 7.5 for further award of NAE/ or must have the patents granted.
- All the centres must submit the reports in the proper format as per the prescribed proforma.
- The time must be devoted by PI for preparing reports in proper format.
- Every centre must adhere to the timelines.
- The Principal Investigator must state action taken, if any, or his comments on observations of Review Meeting. As well as action taken on the recommendations/suggestions of Internal Review committee suggestion in annual as well as final reports.
- All the centres where NAE has been concluded may submit the printed final report as per the format immediately. Changes /modifications if any, as suggested by experts may be incorporated along with ATR.
- Final report to be presented objective wise and must specify the way forward.
- First slide during each review must always be of the suggestions/ATR of the last review meeting as well as comments /ATR of the Internal Review Committee.
- The PIs were advised to keep the Nodal Officer identified by the university in loop regarding progress under NAE.
- Only accredited universities to be funded from the year 2016-17.
- It is expected that university should not shift or transfer the PI without the prior permission/information to Agricultural Education Division, ICAR.
- Each PI must attend assigned work in focussed manner and is responsible for presentation and defending the programme.

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