Dear Readers,

It is my proud privilege to present this volume of the CIAE newsletter.

As you may be aware, agriculture is increasingly becoming knowledge-intensive. The sector is being confronted with challenges posed by climate change, constrained resources, financial uncertainty, fluctuating market price and inefficient supply chains; farmers’ need for information to make complex decisions has increased. Access to the right information at the right time and in the right form helps farmers to make informed decisions on critical issues. Therefore access to the right information for decision making is no more a luxury – it is a necessity. Decision Support System (DSS), a computer technology solution is being used to support decision-making and to solve problems. The affordability of computing capabilities in form of mobile phones have made DSS available in mobile phones in form of applications. Mobile technology holds great promise in giving farmers access to required information and making complex decisions. The boom of mobile technology in the last decade and farmers need to information has led to creation of innovative services and applications (app) that are used within the agricultural value chain and are termed as mobile agriculture or mAgri apps. Government of India has led initiatives to promote mAgri through “mKisan” portal and apps such as “Kisan Suvidha”, “MKisan Application” “Shetkari Masik Android App”, “Crop Insurance mobile app”, “AgriMarket”, “Pashu Poshan” and several others are available free of cost. These mAgri apps and DSS allow agricultural experts and farmers to participate in timely sharing of information on weather, agricultural inputs, market price of agri commodities, and other resources to help take critical decisions on plant protection activities, plant nutrient management, livestock feed management, hiring/renting agricultural services and buying and selling of agricultural commodities.

Looking into prospects of using mobile apps for providing agricultural services several private and public organizations have come forward for providing need based services. Mobile apps such as “Tringo” which offers services for farmers to hire agricultural equipment in five states viz. Maharashtra, Karnataka, Gujarat, Madhya Pradesh and Rajasthan. The “IFFCO Kisan app” provides the latest mandi prices, weather forecast, agricultural advisory, best practices tips related to agriculture, Animal Husbandry, horticulture; a buyer and seller platform, and all agriculture related news and govt. schemes. Several similar android apps providing similar information and agro advisory services are available on “Google play” for free download. Thus, partnership with the private sector has proven to be an essential mechanism for the public sector to develop mAgri tools sustainably.

ICAR-CIAE has come up with DSS for selection of agricultural machinery manufacturer based on geographic location and crop. A Surface Irrigation Management Decision Support System has also been developed for integrated real time irrigation scheduling system. This system is capable of switching on/off the sprinkler irrigation system based soil moisture, medium term weather forecast and water ordering decisions. A multilingual mobile app “Nitrogen Fertilizer Dose Calculator” has also been developed for taking decision on top dress application of Nitrogen fertilizer in rice and wheat crop based on NDVI values of crop canopy. The app is available in English, Hindi, Marathi and Punjabi language. A mobile app driven variable rate fertilizer applicator has also been developed and under testing for site specific Nitrogen management.

Most of mAgri apps are multilingual to cater to needs of farmers in their native language for ease and convenience for use. However, trustworthiness and reliability of the information and advice delivered through such apps is yet to be established and is of paramount importance as the farmers decisions and actions are influenced by what they receive.
Zero-till drill with straw handling mechanism for sowing under heavy residue conditions
The tractor operated sowing/planting machine permits the placement of fertilizer and seeds directly into the soil without any prior tillage, where stumps of an earlier harvested crop are present on the surface of the field.

The preliminary testing of the newly developed prototype has been done at Institute Farm wherein rice crop was harvested with combine harvester, which contained loose straw and stubbles in the tune of about 4.0-8.5 tonnes/ha and stubble height in the range of 125-325 mm. The functional performance of the unit has been observed as satisfactory with regard to all basic functions of cutting the straw, opening the slit, dropping the seed and fertilizer and clearing the straw at the rear end.

Tractor-operated front-mounted three-row sorghum harvester
The tractor front mounted hydraulic operated three-row sorghum harvester consists of row dividers, stalk and earhead cutting blades, two sets of conveyors to convey the cut plant in vertical position, windrower conveyor, earhead storage tank, conveyor height adjustment hydraulic cylinders, hydraulic power transmission system and frame. Plant height adjustment has been done by two sets of single acting hydraulic cylinders mounted on the frame. Power to all the conveyers except windrower conveyor has been provided by hydraulic motors with the help of hydraulic outlet of the tractor. Windrower conveyor has been powered by chain and sprocket in the ratio of 1:2 using one of the hydraulic motors of the bottom conveyor. The two row dividers of the harvester with the help of star wheels feed the plant to the top as well as bottom conveyor. The moment the plant is gripped in both conveyors, the stalk cutting blade situated at initiation of the bottom conveyor, cuts the plant and conveys it in a vertical position. The earhead cutting blade situated at end of the top conveyor cuts the earhead and drops it in earhead storage tank. Then the stalk without earhead is fed to the windrower conveyor which conveys the plant and windrow in the field. The developed harvester has been evaluated in the field. It has been observed that cutting efficiency and conveying efficiency of the stalk ranges from 92-95% and 86-93%, respectively. Similarly, for ear head, the cutting and collection efficiencies are in the range of 83-86% and 77-81%, respectively at the forward speed of 1.5-2 km/h. Actual field capacity and field efficiency of the machine is in the range of 0.23 -0.27 ha/h and 80-83%. The cost of the developed harvester and its operating cost is Rs. 4,00,000/- and Rs. 2500/ha, respectively.

Variable rate urea applicator for top dressing in rice and wheat crops
A variable rate applicator has been developed for site specific top dress application of urea fertilizer in wheat and rice crops. The applicator is portable, 6V battery operated and requires an android smart phone having minimum of Android 2.3+ version, GPS and OTG capabilities for its operation. The applicator has two sets of NDVI sensor and urea metering and dispensing units which cover 4 m of swath width. These
are connected to the onboard controller hardware driven by android smartphone through OTG cable during operation in field. Once connected the equipment senses the crop condition using NDVI sensor mounted on the applicator and the controller android app installed on smart phone. The crop condition judged through sensor readings is used to calculate and dispense the top dress urea dose. The algorithm and crop coefficients have been developed and validated for HI-1544 variety of wheat and Kranti variety of rice at CIAE research farm. However, the applicator can be used for other varieties with development of variety and agro-climatic zone specific crop coefficients. The applicator senses and spreads urea in 4m swath width at the rate of 18.5 to 65 kg of urea/ha while walking across the field at 2 km/h speed. The variable rate top dressing based on crop demand can save up to 10-18% of urea fertilizer as compared to regular practice without compromising yields.

**Growth chamber algal biomass**

A growth chamber has been developed for growing algae in controlled condition (under artificial environment). The algal species chlorella sorokiniana was grown in BG-11 standard media to study the cell concentration and biomass production. The average productivity (dry biomass) has been found as 0.423 g/L/day where as the maximum algal cell concentration has been observed as 1.28 g/L.

**Pilot scale modified atmosphere storage system (MAS) for fruits and vegetables**

Modified atmosphere packaging is considered as a successful technology for increasing shelf life of fresh fruits. The technology is available for small size packages of 1-2 kg. However, appropriate storage system is available for long distance transportation of fruits and vegetables under modified atmosphere condition. Keeping in view, a modified atmosphere storage structure of approximately 100 kg capacity has been developed. The structure is made up of stainless steel perforated sheets and contains 10 numbers of trays for storing fruits and vegetables. The structure has been lined with polymeric films of appropriate specifications as per the requirement of the crop to be stored. A polymeric film (LDPE+LLDPE – 60 microns) has been used as the lining material. Moisture and oxygen absorbers have also been placed inside the structure to maintain appropriate humidity and oxygen concentration inside the structure. The developed structure has been tested for storage of tomatoes and guava fruits. The quality analysis revealed that the parameters namely physiological loss in weight (PLW), firmness, colour (L*, a*, b*), TSS and titratable acidity have been found as 0.3%; 45.88 N; 60.23, -3.25, 32.16; 4.3; and 0.55 of tomatoes after 20 days of storage in MAS system at ambient temperature (23ºC), respectively which is comparable with the quality parameters at harvesting maturity. The control tomatoes samples stored at ambient temperatures have been fully ripened on seventh days of storage. Similarly, the storage life of guava has been extended up to 7 days in MAS system at ambient temperature as compared to 3 days at control ambient storage. The PLW, firmness, colour (L*, a*, b*), TSS, and titratable acidity have been found to be 0.5%; 62.45N; 71.24, 0.25, 46.60; 10.4; and 0.24 of guava after seven days of storage in MAS system at ambient temperature, respectively. The sensory analysis revealed that stored guava and tomatoes sample after 7 and 20 days of storage respectively have been found to be satisfactory.

**Complementary foods for children**

Complementary foods are essential for good growth of children. It is desirable that along with nutrition, such food should have appropriate flavour, texture and taste so that it is acceptable to children and also easy to consume/serve. To
Bone Strengthening Biscuits

Strength of human bones depends heavily on the type of nutrition consumed during childhood. With changing life styles, the need for easy to consume nutritionally rich food for a child is being realized. With this intention, four types of biscuits rich in nutrients known for bone strengthening have been developed. Keeping in mind that children prefer variety in the snack they consume, two salty and two sweet variants have been developed. Analyses of nutritional and function profiles of the developed products are given in the tables below:

<table>
<thead>
<tr>
<th>Biscuit</th>
<th>Protein % (g/100g)</th>
<th>Fat% (g/100g)</th>
<th>Ash% (g/100g)</th>
<th>Calcium% (mg/100g)</th>
<th>Phosphorous% (mg/100g)</th>
<th>Iron% (mg/100g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control salty</td>
<td>6.0</td>
<td>28.3</td>
<td>0.9</td>
<td>53</td>
<td>56</td>
<td>0.6</td>
</tr>
<tr>
<td>Sesame salty</td>
<td>10.1</td>
<td>30.2</td>
<td>2.4</td>
<td>266</td>
<td>203</td>
<td>3.3</td>
</tr>
<tr>
<td>Soy-butter salty</td>
<td>13.6</td>
<td>30.4</td>
<td>2.6</td>
<td>201</td>
<td>221</td>
<td>4.5</td>
</tr>
<tr>
<td>Control sweet</td>
<td>5.7</td>
<td>29.6</td>
<td>0.7</td>
<td>64</td>
<td>89</td>
<td>0.4</td>
</tr>
<tr>
<td>Sesame sweet</td>
<td>9.4</td>
<td>29.8</td>
<td>1.2</td>
<td>228</td>
<td>177</td>
<td>3.2</td>
</tr>
<tr>
<td>Soy-butter sweet</td>
<td>10.0</td>
<td>30.0</td>
<td>1.2</td>
<td>174</td>
<td>177</td>
<td>2.1</td>
</tr>
</tbody>
</table>

The protein content of the bone strengthening biscuits has been observed significantly higher than the control biscuits and ranges from 10 to 13.6 g/100g of biscuits as compared to 6g/100g in control. Similarly the calcium content of the test biscuits ranges from 174 to 265 mg/100g which is significantly higher than control biscuits in which the calcium content is only 52-64mg/100g. The iron content of the biscuits is also significantly higher than control. The nutritional content of the salty biscuits are higher than the sweet biscuits for all parameters. The results for functional quality of the biscuits also follows the same trend as the nutritional quality where the levels of phenolics, flavonoids and anti-oxidants are significantly higher in developed biscuits compared to control samples.

<table>
<thead>
<tr>
<th>Biscuit</th>
<th>Phenolics (GAE mg /100g)</th>
<th>Flavanoids (QE mg /100g)</th>
<th>Antioxidants (%RSA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control salty</td>
<td>13.7</td>
<td>Nil</td>
<td>Nil</td>
</tr>
<tr>
<td>Sesame salty</td>
<td>39.1</td>
<td>2.0</td>
<td>29.5</td>
</tr>
<tr>
<td>Soy-butter salty</td>
<td>23.3</td>
<td>1.5</td>
<td>25.1</td>
</tr>
<tr>
<td>Control sweet</td>
<td>17.8</td>
<td>Nil</td>
<td>Nil</td>
</tr>
<tr>
<td>Sesame sweet</td>
<td>35.5</td>
<td>1.0</td>
<td>70.6</td>
</tr>
<tr>
<td>Soy-butter sweet</td>
<td>27.3</td>
<td>0.9</td>
<td>28.2</td>
</tr>
</tbody>
</table>

address this issue, ready to use Comfo (complimentary food) spread has been developed. It is a high viscous product prepared by mixing dry and powdered ingredients (dry soymilk products, pre-cooked soyflour, sugar, salt, Moringa leaves, cocoa powder, etc.) with vegetable fats. The developed product has a very low (3-4%) moisture content, hence good storability. Protein and fat contents of the products ranged from 34-36 % and 32-35 %, respectively. High protein density comfo spread has high iron (17-19 mg/100 g) and phosphorus (11-13 mg/100 g) content. The antioxidant activity (DPPH free radical scavenging activity) of the products was very high (85-90%). The protein digestibility of the developed product is more than 80-82%. The Moringa leaf powder used in the mix is rich in minerals and micronutrients while cocoa powder, salt, sugar and fats provide flavour, taste and texture. Soybean supplements protein content. The product has an overall acceptability of 8.4 on 9-point hedonic scale. The product has advantages like high energy and nutrient density, very good acceptability and resistance to bacterial contamination. The developed spread can be mixed with meals or porridges and given to infants and children or consumed directly as snacks.
Performance of rice crop under different micro irrigation systems

Experimental investigations have been conducted to study the effect of different irrigation systems on Rice (PS 1121 variety) crop cultivation. Five irrigation treatments have been considered for the experiment. The treatmental details are: T1: Conventional practices, T2: System of Rice Intensification with rain-hose (perforated pipe) irrigation, T3: System of Rice Intensification with drip emitters spaced at 20 cm, T4: System of Rice Intensification with drip emitters spaced at 20 cm under plastic mulch condition and T5: System of Rice Intensification with portable sprinkler irrigation system. The maximum plant height (98 cm), number of tillers (53), SPAD value (43) have been observed as and were recorded highest under treatment T4 and similarly the yield and yield attributing parameters viz: productive tillers (41.20), panicle length (29.30 cm) and grain yield (4.59 t/ha) have been significantly higher in this treatment as compared to conventional practices (T1). Water productivity and energy productivities for the selected treatments have also been analysed and it has been found that water productivity in all the treatments are higher than the conventional practice.

Rice crop growth parameters during 2016-17

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Conventional practice</th>
<th>Perforated pipe irrigation</th>
<th>Drip Irrigation</th>
<th>Drip irrigation plus plastic</th>
<th>Portable Sprinkler irrigation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plant height at maturity, cm</td>
<td>88.43</td>
<td>91.2</td>
<td>95.23</td>
<td>98.66</td>
<td>81.21</td>
</tr>
<tr>
<td>No. of tillers per hill</td>
<td>20.40</td>
<td>23.50</td>
<td>35.00</td>
<td>53.00</td>
<td>18.54</td>
</tr>
<tr>
<td>No of effective tillers per hill</td>
<td>19.20</td>
<td>22.00</td>
<td>32.60</td>
<td>41.20</td>
<td>16.87</td>
</tr>
<tr>
<td>Ave. SPAD values</td>
<td>40.90</td>
<td>41.85</td>
<td>42.87</td>
<td>43.03</td>
<td>40.30</td>
</tr>
<tr>
<td>Length of panicle, cm</td>
<td>27.30</td>
<td>28.33</td>
<td>28.50</td>
<td>29.30</td>
<td>27.10</td>
</tr>
<tr>
<td>Rice Yield t/ha</td>
<td>4.01</td>
<td>4.03</td>
<td>4.27</td>
<td>4.59</td>
<td>3.85</td>
</tr>
<tr>
<td>Qty of water applied during puddling</td>
<td>2000</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Effective Rainfall, m³/ha</td>
<td>4250</td>
<td>4250</td>
<td>4250</td>
<td>2108</td>
<td>4250</td>
</tr>
<tr>
<td>Qty of water applied, m³/ha</td>
<td>2188</td>
<td>1180</td>
<td>1134</td>
<td>1038</td>
<td>1444</td>
</tr>
<tr>
<td>Total qty of water</td>
<td>8438</td>
<td>5430</td>
<td>5384</td>
<td>3146</td>
<td>5694</td>
</tr>
<tr>
<td>Water productivity, kg/m³</td>
<td>0.47</td>
<td>0.74</td>
<td>0.79</td>
<td>1.46</td>
<td>0.67</td>
</tr>
</tbody>
</table>

Conventional rice
Perforated pipe irrigated rice
Drip irrigated Rice
Rice under drip plus plastic mulching
Portable sprinkler irrigated Rice
Fermented Whole Grain Sorghum flour

Sorghum flour has poor low shelf-life due to development of free fatty acids and off-odours. A protocol that includes fermentation and appropriate storage of sorghum flour has been developed. This process involves fermentation under controlled conditions using tofu whey based culture media. The flour so obtained is packed in polymeric film pouches (LDPE100µ, PP50µ, and metalized film40µ). Protein digestibility, free fatty acid content and microbial viability count have been monitored as quality parameters during storage. After 40 days of storage, it has been observed that the protein digestibility of fermented flour samples have been 5-7% more than the control samples (74-76 % for raw flour against 81-83% for fermented flour), also the free fatty acid content, an undesirable phenomenon is at considerably higher level in unfermented samples (0.3%) compared to fermented flour samples under optimized packaging (0.13%) after 30 days of storage. Due to fermentation the antioxidant level has been also found to be increased by about 7-8%. Overall, it has been concluded that raw sorghum flour that can be stored for about 15 days can be stored for up to 30-45 days by employing the developed process and suitable packaging material.

Post-harvest mechanization package for banana central core

A package of equipment for the minimal processing of banana central core consists of slicer, dicer, fibre remover, surface water remover, juicer /grinder and juice squeezer. By using this package of equipment, one can save time and cost up to 65% and labor by 75% for minimal processing/ juice extraction of banana central core. The banana central core, which otherwise goes as waste, can be converted into value added nutritious products for human consumption, thus helping in generating additional revenue to banana farmers / entrepreneurs / processors. The total cost of the package of equipment is about Rs. 2.00 lakhs with a pay back period of about 250 working days.

A farmer Shri Harinarayan Gahlod from Pipiliya Gajju village, Raisen district was interested in cultivating of orchard of different fruit crop like sweet orange, ultra high density guava and pomegranate. He underwent training in the year 2013 at Precision Farming Development Centre, Bhopal and understood the importance of adopting drip irrigation system along with the fertigation systems in vegetable and fruit cultivation. In an area of 2 ha land, he installed drip irrigation system at a total share of his investment at Rs. 50,000/- with the help of subsidy provided by the state government. By fertigation with ventury, he saved about 40 to 50 per cent investment on fertilizers over conventional system. After introduction of drip irrigation system in 2013, he earned a net profit of about Rs. 5 lakhs annually. He is aiming to adopt plastic mulching and protray nursery raising techniques in future.

Shri Yugal Kishore Bisen a 45 Year old High School passout has Agriculture Land in Seoni District Madhya Pradesh. His Family was cultivating traditional field crops in area of 5 acre that he owns. By cultivating paddy during kharif and wheat or gram in rabi, he was earning a net income of about Rs. 2 lakhs annually. After he attended training programmes organized by PFDC and guidance of scientists of the PFDC, he was convinced of generating higher income from vegetable cultivation under drip irrigation system. With the help of state horticultural department he got subsidy (50 %) for installing drip irrigation system in five acre area under NHM. By cultivating tomato under drip irrigation with plastic mulching, he got a total produce of about 60 tons from his five acre area. He sold the produce in open market at an average price of Rs.15/ kg and after deducting the operational expenses of Rs 1,85,000/- he got a net profit of Rs.7,15,000 in six months. He is disseminating the technology to other farmers.
Success Story - Entrepreneurship on Agricultural Machinery Custom Hiring Centre

Shri Anil Pratap Singh is a resident of village Semariya of Rewa district. His family owns about 2 ha land in Rewa district. To augment his net income, he became interested in custom hiring business of agricultural machinery in his village and received training from ICAR-CIAE, Bhopal after enrolling in entrepreneurship development programme of Directorate of Agricultural Engineering, Government of M.P. which is funded by Department of Agriculture, Cooperation and Farmers’ Welfare, Government of India. After successfully completing the training, he established his custom hiring business centre at Semariya village naming it as ‘Shiv Mahima Custom Hiring Centre’, with an investment of Rs. 21 lakhs in March 2014. His venture was financed by Allahabad Bank, Rewa. In the beginning, he bought two tractors (48 and 55 hp) along with one reversible MB plough (2 bottom), front dozer (width 8 feet), two rotavators (1.8 and 2 m) two cultivators (both 11 tynes), seed-cum-fertilizer drill (11 rows), and tractor operated paddy thresher. He already had one 35 hp tractor, one 11-rows zero till drill and one self-propelled walk behind reaper under his possession. Gradually, he expanded his business by purchasing raised bed maker-cum-seeder (6 rows on 3 beds), self-propelled walk-behind type paddy transplanter (4 rows) and straw reaper. With his entrepreneurial skill, zeal to adopt new technology and wide range of farm machinery inventory, he specialized in complete mechanization of paddy-wheat cropping system for the farmers in his area and also promoting raised bed cultivation for kharif crops. He rents out these machines to many farmers of his village and also surrounding villages of Rewa block for cultivation of field crops like paddy, soybean, wheat, and chickpea. He generated gross revenue of around 11 lakhs with a net profit of about Rs. 5 lakhs in 2015-16. With technical guidance from CIAE scientists, He is also planning to procure LASER guided land leveller to offer the complete mechanization package starting from land preparation and levelling to residue management to his clients for paddy-wheat cropping system.

Millet Processing Center established in tribal area of Madhya Pradesh

Millets like Kodo, Kutki and Sama are staple foods for the tribals in the Patalkot tribal belt in Satpura ranges of Madhya Pradesh. These nutritionally rich cereals are now getting extinct due to its low productivity and drudgery prone production operations. The Institute provided technical expertise and machines to establish a Millet Processing Centre (MPC) at Village Harshdiwari, Block-Tamia, Dist. Chhindwara (MP), approximately 250 km from Bhopal. The MPC was inaugurated on 4 November, 2016 by Dr KK Singh, Director ICAR-CIAE. The centre is located in a facility sponsored under UNDP project and operated by Madhya Pradesh Vigyan Sabha. Tribal families and Sarpanch of the village, officials of the NGO, NABARD and ICAR-CIAE were present at this occasion. The MPC, established with technical guidance provided by CIAE scientists, consists of machines for cleaning and destoning, dehusking, pearling, grinding, flour separation and packaging. The MPC is capable of processing 100 kg millet per hour. The facility would be used on custom hiring by around 10 identified self-help groups and the produce would be marketed through various channels. Sarpanch of the Village Mrs. Sarojini Uike, expressed her satisfaction over creation of the facility. She said that even if other food grains like maize and rice have now become part of their daily diet, millets are still important to them as diet as well as for many social customs. She observed that a task that took about 3 to 4 hours of hard work now takes less than 15 minutes to accomplish without compromising the product quality and negligible drudgery.
Real Time Irrigation Management using Sensors Network, DSS and Electronic Controls for Precision Agriculture in Vertisols

This was organized during December 01-21, 2016. Nineteen participants from eight states viz. Nagaland, Jammu & Kashmir, Delhi, Jharkhand, Bihar, Maharashtra, Gujrut, and Madhya Pradesh participated in the Winter School. It was inaugurated by Dr VN Sharda, Member, Agricultural Scientists Recruitment Board (ASRB) on 1 December, 2016. The course was designed to develop the competencies of the scientists/ researchers for planning, design, execution, monitoring and evaluation activities of automated irrigation systems using irrigation schedules based on climatic parameters (evapo-transpiration) as well as real-time soil moisture sensors for better efficacy and efficiency. During these twenty one days the participants were trained through lectures, field visits and practical exercises on the issues related to principles of irrigation scheduling, crop water requirement estimation, planning, design, installation and operation of irrigation systems, real time soil moisture assessment using sensors and telemetry system, automation of irrigation systems with fertigation, wireless sensor networking, DSS for irrigation scheduling using electronic control and solenoid valves, environmental, social and economical aspects of irrigation systems.

The valedictory function of the school was held on 21 December, 2016. Dr Gyanendra Singh, Ex-VC, Mahatma Gandhi Chitrakoot Gramodaya Vishwavidyalaya and Ex-Director, ICAR- CIAE, Bhopal was the Chief Guest of the function. In his valedictory address he stressed importance of on-farm water management for enhancing water use efficiency and use of advanced technologies, such as sensors, controllers, wireless sensor network and instrumentation technologies for precision irrigation. Dr. Singh also congratulated the participants for their successful completion of the Winter School. A brief training report of the Winter School was presented by the Course Director, Dr Ramadhar Singh. The participants expressed their satisfaction on the course contents and the way the training programme was organized.

ICAR Sponsored Winter Schools

Renewable energy for productive uses in rural agro-processing sector

The Winter school on Renewable energy for productive uses in rural agro-processing sector was organized during November 09-29, 2016 and attended by 15 participants (for NARS Researchers and other stakeholders) from seven states representing SAUs, ICAR Institutes and KVKs. During the 21 days programme, lectures and practices on Advances in solar photovoltaics, Solar refrigeration system, Solar drying techniques, Solar thermal gadgets for processing applications, Solar biogas hybrid power generation, Biomass briquetting and gasification technologies, Bio-oil production and applications, Advances in biogas production, Bio-fuels and bio-refineries, Pyrolysis of biomass, Small scale milling of pulses and cereals-technology and machinery, Fruits and vegetable processing, Soybean processing, Processing and value-addition of millets, Feed processing, Minor forest produce processing were conducted to provide hand-on experience to participants. Field visits were organized to demonstrate biomass based power plants at Village Mana, raisen district, Processing of honey and other minor forest produces at Minor Forest Produce Processing and Research Center, Bhopal, and Soy milk and powder manufacturing at M/s Bio Nutrients (I) Pvt. Ltd., Mandideep. The winter school helped the participants in improving the knowledge and skills in renewable energy technologies and their possible applications in agro-processing activities.
Training for Technical Personnel of ICAR Institutes

Training on Operation and Maintenance of Improved Implements and Machinery was organized during December 12-17, 2016 for Technical Officers of ICAR Institutes. Sixteen technical staff from eleven ICAR institutes of five Subject Matter Divisions participated. The different sessions on operation and maintenance of tillage implements, seeding and planting machinery, transplanters, plant protection equipment, harvesting and threshing machinery etc; testing and quality control of agricultural machinery; farm implements for conservation agriculture; power tiller operation and matching implements; energy gadgets; protected cultivation; irrigation and drainage systems; and ergonomics and safety in agriculture with women friendly engineering technologies were covered. The training also focused on demonstration, group discussions and hands on activities for the participants.

Training for Farmers under CRP on FMPF

Under CRP on FMPF, two training on Hands-on Training for Farmers on Improved Agricultural Implements and Machinery was organized during 25-27 October, 2016; 28-30 November, 2016 and on 16-18 December, 2016. Total 220 farmers from Chhattisgarh, Madhya Pradesh, Maharashtra and Rajasthan participated. During the training, participants were briefed on updates of technologies on farm mechanization and agro processing and given hands on training. Visits to laboratories of CIAE were arranged for exposure to recent available agricultural technologies; demonstrations of improved agricultural mechanization technologies and common adjustments required for efficient working of farm equipment. Demonstrations of operation-wise implements required for seed bed preparation, sowing/planting and transplanting, spraying, interculture as well as harvesting and threshing were imparted. Women friendly tools/implements, conservation agriculture machinery and bullock drawn machinery were also demonstrated. Equipment useful for mechanization of garlic cultivation were also shown as majority of farmers from Rajasthan state cultivated garlic as their main crop. Covered cultivation techniques for crop production were also demonstrated.

Under CRP on FMPF, the Regional Centre, Coimbatore organized training on Operation and Maintenance of Agricultural Machinery to farmers/rural entrepreneurs during October 19-20, 2016 at KVK, Vamban, Pudukkottai district and KVK, Sikkal, Nagapattinam district, Tamil Nadu in which 125 farmers participated. The farmers were explained about the functioning of machinery for mechanization with a special emphasis on pulse cultivation to the farmers of Pudukkottai district and operation and maintenance of rice transplantsers to the farmers of Nagapattinam district. Farmers were also informed about newly developed technology, machinery for horticultural and rice cultivation machinery. An exhibition of rice and pulse crops machinery was arranged for the benefit of the farmers in both the places.

Training on Value Addition from Vegetables

Regional Centre, Coimbatore conducted hands on training on Value addition from vegetables for 56 rural women entrepreneurs at vegetable growing area in Coimbatore District on 22 October, 2016. This programme was also used as a platform for disseminating the technologies developed by the Centre, in view of sensitizing the women entrepreneurs. Hands on training was given for the preparation of value added products like pickles , ketchup, sauce etc from tomato by Dr Saraswathi Eashwaran, retd Professor from TNAU, Coimbatore. The cost economics advantage which could be gained by value addition was detailed to the participants. The women entrepreneurs were motivated to take up field processing/ value addition of vegetables which are grown in abundance in these areas, thereby giving them more financial strength.
Other Trainings Conducted

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Topic</th>
<th>Date</th>
<th>No of participants</th>
</tr>
</thead>
</table>
| 1      | Custom hiring of agricultural machinery for entrepreneurship development | 1-7 October  
2-8 November  
9-16 November | 33  
18  
21       |
| 2      | Entrepreneurship development programme on soy milk and soy paneer   | 17 – 22 October  
21-26, November | 17  
17       |
| 3      | Soybean processing for diversified food uses                        | 15 -19 November            | 10                |
| 4      | Farm machinery processing and renewable energy technology           | 17-18 November             | 50                |
| 5      | State level KVK officials workshop on farm mechanisation             | 5 November                | 28                |

Participation in Exhibitions

<table>
<thead>
<tr>
<th>Name of the Exhibition</th>
<th>Place</th>
<th>Date(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Farmers’ Fair</td>
<td>ICAR-IISWC, Udhagamandalam</td>
<td>20 Oct, 2016</td>
</tr>
<tr>
<td>Exhibition on Waste to Wealth</td>
<td>KVK Shikohpur, Gurgaon</td>
<td>27 Oct, 2016</td>
</tr>
<tr>
<td>Indian Horticulture Congress Mela</td>
<td>ICAR-IARI, New Delhi</td>
<td>15-18 Nov, 2016</td>
</tr>
<tr>
<td>CII Agro Tech exhibition</td>
<td>Chandigarh</td>
<td>17-20 Nov, 2016</td>
</tr>
<tr>
<td>Science Fiesta</td>
<td>Regional Science Centre, Bhopal</td>
<td>18-19 Nov, 2016</td>
</tr>
<tr>
<td>Northern Regional Agril Fair</td>
<td>Muzaffarnagar</td>
<td>28-30 Nov, 2016</td>
</tr>
<tr>
<td>International Exhibition on Agro Processing and Value Addition</td>
<td>Thiruvananthapuram</td>
<td>1-5 Dec, 2016</td>
</tr>
<tr>
<td>National Summit for FPO/ FPC &amp; Agri-Startup 2016</td>
<td>SIAET, Govt. of MP, Bhopal</td>
<td>15-16 Dec, 2016</td>
</tr>
<tr>
<td>Mega Agri Exhibition Krishi Charcha</td>
<td>Dr. PDKV University, Akola</td>
<td>27-29 Dec, 2016</td>
</tr>
</tbody>
</table>
New Project
The National Committee on Plasticulture Applications in Horticulture (NCPAH) under Ministry of Agriculture & Farmers’ Welfare has approved project titled “Solar Powered Micro Irrigation Systems” with a gross outlay of Rs. 25.28 lakhs for three year duration. The project is funded under “Prime Minister Krishi Sinchai Yojana” to promote use of solar power in micro irrigation systems.

Prototype Production and Supply
CIAE prototypes (1494 Nos.) worth Rs. 12.37 lakhs were supplied to different stakeholders.

Media Activities
Dr Dipika Agrahar Murugkar, Principal Scientist delivered radio talk - Tamatar se nirmit sanrakhshit padarth evam aavashyak savdhaniyan on 27 November, 2016.

Doordarshan Programme
PFDC officials of the Institute appeared in 6 Krishi Darshan programmes of Doordarshan Kendra, Bhopal. They provided information on rose cultivation, wheat irrigation methods, acid and chlorine treatment for drip line cleaning, tomato cultivation in open field, shade net house and polyhouse cultivation as well as low head micro Irrigation system.

Copyright Application
Copyright application was filed for the Software on Economic-Financial Viability Analysis of Micro-Small-Medium Enterprises/Agro Processing Unit.

Human Resource Development
Dr Sadvatha RH, Scientist attended Winter School on Recent advances in post-harvest management of fruits, vegetables and flowers for minimization of quantitative and qualitative losses at IIHR, Bengaluru during 2-22 November, 2016.


Director CIAE participates in International Science Festival
Dr KK Singh, Director, CIAE made a presentation on Agricultural Mechanization in Public-Private Partnership in the Academic-Industry Meet on 11 December, 2016, on the occasion of Second India International Science Festival organized at CSIR-National Physical Laboratory, New Delhi during 7-11 December, 2016.

Foreign Deputation
Dr KK Singh, Director, CIAE visited Hanoi, Vietnam during November 23-25, 2016 to participate in the 4th Regional Forum on Sustainable Agricultural Mechanization in Asia and the Pacific of CSAM. Regional Forum on Sustainable Agricultural Mechanization is an annual strategic initiative of CSAM for high-level policy dialogues and regional cooperation in the field of agricultural mechanization in the region. The meet was co-organized by the Centre for Sustainable Agricultural Mechanization (CSAM) of the Economic and Social Commission for Asia and the Pacific (ESCAP), and Vietnam Institute of Agricultural Engineering and Post-Harvest Technology (VIAP). The forum focused on how low-carbon technologies and innovative practices available across the Asia-Pacific region are distributed and applied. Participants also shared outcomes of their initiatives regarding sustainable agriculture. Additionally, the forum outlined ways to improve cooperation between stakeholders regarding climate-smart agricultural technology and practices in order to achieve the Sustainable Development Goals and further reduce the region’s impact on climate change. Dr Singh also made a presentation on Climate Smart Agriculture and Mechanization in India.

Awards and Recognition
Dr MK Tripathi, Senior Scientist was honoured with “Marvellous Personality of INDIA Award 2016 in Science” chapter by Hon'able Governor of West Bengal Shri Keseri Nath Tripathi at Lucknow on 26 November, 2016 for contribution in science.

PUBLICATIONS
Research Papers


PUBLICATIONS


Technical/ Extension Bulletin


Naik Ravindra and Annamalai SJK. 2016. Mechanization package for juice concentration of Garcinia Combogia. Extension Folder no CIAE/RC/2016/03


Book


Presentations in seminars, conferences and symposia


Book Chapters


Senthilkumar T. 2016. Sustainable farm mechanization techniques for managing hydrological behavior of Agricultural watershed. In Training Manual on Advanced technologies in watershed hydrology to mitigate climate change impact on soil and water resources. ICAR-IISWC, Regional Centre, Udhagamandalam, pp. 217-232

Senthilkumar T. 2016. Sustainable farm mechanization techniques for managing hydrological behavior of Agricultural watershed. In Training Manual on Advanced technologies in watershed hydrology to mitigate climate change impact on soil and water resources. ICAR-IISWC, Regional Centre, Udhagamandalam, pp. 217-232

Health Awareness Programme

A health awareness programme on "Naturopathy – Health benefits the natural way" was organized on 4 October, 2016 by the Women's cell of ICAR-CIAE. Dr Manish Rajvaidya, specialist in Naturopathy addressed the staff of CIAE and explained to them about the meaning of naturopathy and its effects in maintaining a disease free lifestyle. He gave many tips and suggestions to be adopted in everyday life to remain healthy and stress free without depending on medication. The staff of CIAE and the ladies from the CIAE staff quarters participated actively in the program. They posed many queries which were answered thoroughly by Dr Rajvaidya. Smt Jolly John conducted the program and the vote of thanks was delivered by Er Harsha Wakudkar.

World Food Day

To commemorate the World Food Day – 2016, the Institute in collaboration with ICDS, Bhopal District and AFST(I) – Bhopal Chapter organized a seminar on 18 October, 2016. The workshop was attended by about 50 officials of ICDS and scientists of the Institute. The workshop was themed at "Panchwati se Poshan". Dr Nachiket Kotwalwale, Head, APPD and Chairman AFST(I) – Bhopal Chapter deliberated upon importance of World Food Day, its current year theme "Climate is changing: so should food and agriculture" and prevention of food losses. Dr. Ramadhar Singh, I/c Director called upon all participants to take advantage of scientific research carried out in CIAE and deliver the knowledge to the end users. Sh. Sanjay Tripathi, District Project Officer talked about objectives of the "Panchwati se Poshan" programme. He suggested that CIAE and ICDS should collaborate to establish Panchawati based enterprises by women group. During the workshop Dr. Sumedha Deshpande, Principal Scientist talked about various issues of malnutrition and methods to combat it. She along with Dr. MK Tripathi, Dr. Shalini Chakraborty, Sh. Ajay Yadav and Dr. SP Singh deliberated upon the various components of Panchwati i.e. Amla, Karonda, Wood Apple, Lime and Moringa. A display of various food products developed at CIAE was also organized.
Brain Storming Session-cum-Interaction Meet

Horticulture is one of the most potential and upcoming sector of Indian agriculture, as it contributes significantly towards economic development, employment generation and sustainable management of Agricultural and allied bio-resources. Wide variety of horticultural crops contributes over 33% to agricultural GDP. With increasing shortage of labourers for critical unit operations, the role of mechanization in production and post-production horticulture has increased and there are many unit operations in value chain of horticultural crops which require urgent engineering intervention and need time bound collaborative and interdisciplinary R&D efforts. To address this issue a “Brain Storming Session-cum-Interaction Meet on Engineering Interventions for Production and Processing of Horticultural Crops” was hosted by the Institute during 24-25 October, 2016. Scientists of 21 ICAR Institutes and CIAE working in the area of horticultural mechanization and processing actively took part in the deliberations held during the brain-storming session. All the participants working in different specific areas of horticulture and interested in mechanization and processing activities in horticulture presented status, gaps their importance and priorities for specific group/commodities viz. fruits, vegetables, flowers, medicinal and aromatic plants, spices, nuts etc. During the deliberations and discussions, readily available solutions were suggested wherever available and priority programmes were identified for taking up research in the collaborative mode. This interaction meeting also helped grouping of problems posed for different commodities. It was also decided that a team of scientists from ICAR-CIAE would visit the Institutes wherever necessary, to further identify the specific problems and research strategies. The session was chaired by Dr WS Dhillon, ADG (Horticulture), ICAR HQ, New Delhi. The deliberations were moderated by Dr KK Singh, Director ICAR-CIAE Bhopal. Major facilitators were Dr MG Nayak, Director NRC for Cashew Puttur; Dr DR Singh, Director NRC for Orchids, Pakyong; Dr KV Prasad, Director Directorate of Floriculture Research, Pune; Dr Vishal Nath, Director, NRC on Litchi, Muzzafarpur; Dr James George, Director, CTCRI, Thiruvananthapuram and Mr. Rajiv Chaudhary, Director, Directorate of Agricultural Engineering (Govt. of M.P.), Bhopal. The delegates expressed keen interest in the technologies demonstrated during the visit of the various facilities at ICAR-CIAE, Bhopal.

State-level Workshop on Farm Mechanisation

A one day State-level KVK official’s workshop on Farm Mechanisation was organised by Regional Centre, Coimbatore on 5 November, 2016 in which participants from 28 KVKs across Tamil Nadu and Puducherry participated. The focus and long-term expected result of the workshop was designing farmer participatory interventions and recommendations for farm mechanization through KVK system. The workshop included three technical sessions viz. Glance on KVK mechanization activities, Brainstorming on Farm Mechanisation, and Road mapping for Farm Mechanisation. In the forenoon session, all the participants presented their respective mechanization activities with identification of mechanization gaps which resulted in the formulation of district level road-map in consultation with the experts and manufacturers in succeeding sessions. Subsequently, the agro-climatic zone-wise KVK groups (8) were formed and developed region-specific status and gap in mechanization. In discussion with Dr SJK Annamalai, Head, CIAE RC; Dr D Manohar Jesudas, Head, AMRC, TNAU; Dr N Gopalakrishnan, PS, CICR Regional Station; Dr V Venkatasubramanian, PS, Sugarcane Breeding Institute; Er CV Madeswaran, MD, KSNM Marketing Ltd., Coimbatore; and Er S Veluchamy, MD, Magnificent Engineers Ltd., Coimbatore, the recommendations and next steps were identified and communicated to the heads of officials/engineers of KVKs.
DG ICAR visits ICAR-CIAE Bhopal and Regional Centre, Coimbatore

Dr. Trilochan Mohapatra, Secretary, DARE and Director General, ICAR along with Dr. SK Chaudhari, ADG(SW&M) and Dr. PK Agrawal, ADG(NASF) visited ICAR-CIAE, Bhopal, on October 6, 2016. Dr. Mohapatra addressed staff of the Institute and visited the institute's Agricultural Equipment Display Centre, Prototype Production Centre and observed demonstration of some of the recently developed agricultural equipment by ICAR-CIAE. In his address, Dr. Mohapatra highlighted the role of mechanization in Indian agriculture and lauded the contribution made by ICAR-CIAE. He urged scientists to develop need-based agricultural machines, suiting to small farm mechanization. He emphasized on development of precise agricultural machinery at par with international norms and to ensure quality of machinery developed. He appreciated the study undertaken by ICAR-CIAE on impact of agricultural engineering technologies on Indian agriculture and its assessment in monetary terms. He stated that such studies are helpful to the Council while presenting contribution of ICAR in Indian agriculture. He suggested that the assumptions taken in the study should be robust, logical and scientifically valid. He also appreciated that ICAR–CIAE has helped in creation of over 125 soy based enterprises and over 400 custom hiring centres, which helped the national cause of employment and income generation. He advised that such success stories be documented and their video films be prepared to motivate others to take Agri-Business Entrepreneurship. He appealed that more attention be paid to skill development programme, initiated by Govt. of India. Dr. Mohapatra, appreciated the role of Institute's Prototype Production Centre for multiplication of prototypes and providing the newly developed technologies to KVKs and other stakeholders for testing, feedback and popularization. He urged that ICAR-CIAE should encourage technology commercialization and the industrial liaisoning to ensure better quality machinery to the farmers. He urged institute to undertake development of more and more post harvest and value addition technologies but advised to avoid duplication of R&D efforts and for that institute should organize interaction meet with engineers of other institutes. He expressed happiness that institute has been enriched with a large number of young and energetic scientists and advised them to go through the documents of the Council and the institute's vision 2030 and 2050 and take up projects accordingly.

Director General ICAR visited Regional Centre on 11 November 2016. During his visit, equipment and technology like sugarcane bud chip technology, rope making from banana pseudostem, minimal processing of banana central core, banana pseudostem shredder, moringa leaf stripper, multiplier onion peeler, aloevera gel extractor, curry leaf stripper, millet mill, cassava stake cutter planter etc., developed by CIAE-RC were demonstrated. Dr. Kanchan K Singh, Assistant Deputy Director General (Farm Engineering) was also present on this occasion. Dr SJK Annamalai, Head, CIAE-RC and all scientists from CIAE-RC explained the activities of the centre. Dr. Mohapatra interacted with the scientists and entrepreneurs present during the visit. He suggested to the scientists to take the technology further for large scale adoption throughout the country and document the success stories of technologies.
REPORTS

Annual Workshop of AICRP on UAE

The 16th Annual Workshop of ICAR- All India Coordinated Research Project on Increased Utilization of Animal Energy with Enhanced System Efficiency was organized at CIAE during 2-3 December, 2016. The Principal Investigators and Research Engineers working in the AICRP, SAUs, NGOs and members of relevant industries participated in the Workshop.

The Chief Guest, Dr VN Sharda, Hon'ble Member, ASRB, New Delhi emphasized the importance of animal energy in Indian agriculture despite the growth of electro-mechanical energy in various agricultural operations. He remarked that initiatives for doubling the farmers' income may be practically possible using animal energy and suggested that new areas of research on utilization of animal energy to enhance the income of farmers and reduction of drudgery in farm operations may be taken up.

The Chairman, Dr Kanchan K Singh, ADG (FE), ICAR advised the researchers to increase the focus on utilization of resources, enhancement of the system, reduction of time and cost for agricultural operations and urged them to take various technologies to farmers' field effectively taking in cognizance the state and regional needs. The Guest of Honour, Dr BS Prakash, ADG (ANP), ICAR emphasized the importance of the animal energy and its relevance for small and marginal farmers of the country and expressed his concern for adequate nutrition, shelter, health and environment aspects of draught animals and suggested for multi-disciplinary approach for research on developing improved implements.

Dr KK Singh, Director ICAR-CIAE expressed that the AICRP on UAE has to play a major role in the small farm mechanization in states like Chhattisgarh, Odisha, Maharashtra, Jharkhand, Bihar etc. and hill mechanization. The Project Coordinator, Dr M Din presented the Project-Coordinator's report and highlighted the significant achievements of different Centres on development, refinement and adoption of improved animal drawn implements tailored to meet the requirements of small and marginal farmers who depend upon animal power for most of agricultural operations.

On this occasion, three folders, two technical bulletins namely Bullock drawn solar powered high clearance sprayer, Low cost Animal housing Structure: CD: a documentary on improved bullock drawn implements for small farmers of Odisha” and a calendar of 2017 in Marathi displaying technologies for Marathwara region was also released.

Sensitization Workshop cum Training

Sensitization Workshop-cum-Training on Recent Agricultural Engineering Technologies was organized during 5-9 December, 2016 for SMS of KVKs and Extension Officers of different states. The main objective of the workshop-cum-training was to create awareness among the Extension Officers on recently developed engineering technologies to facilitate their promotion and enhance mechanization in Indian Agriculture. Seven participants participated in the workshop.

Swachthha Pakhwada

Swachthha Pakhwada was organized during 16-31 October, 2016. Many programmes- cleanliness campaign in villages, blood donation camp, lectures by subject matter specialists were organized. For emanating a core message of ‘Swach Bharat Abhiyan’ amongst villagers, scientists of the Institute choose the medium - Mera Gaon Mera Gaurav. Public awareness was created by organizing seminar on energy, bio-composting, methanation procedure and energy received from these sources. Health Officer of Bhopal Municipal Corporation (Zone-17) was invited to deliver a lecture. He informed the causes of vector borne diseases i.e. dengue and chikungunya and their treatment and elimination. The Health Officer also gave tips on the causes of environmental pollution and the measures for controlling them. Dr PK Shrivastav, Senior Scientist of MP Pollution Control Board was also invited. In his lecture, he highlighted the various causes of pollution being generated in urban and rural areas such as ground water, pollution of soil layers and soil health, e-waste and its management. Special Guest of the concluding day was Shri Vishwas Sarang, Bhopal Gas Tragedy Relief and Rehabilitation Minister, Government of Madhya Pradesh. He opined as to how villages and small towns can be made clean in order to make available good health for the citizens.

Vigilance Awareness Week

Vigilance Awareness Week was organized at the Institute during 31 October to 5 November, 2016. The main topic of this week was “People’s Cooperation in promoting honesty and eradicating corruption”. A quiz was organized on 1 November, 2016 whereas debate competition was held on 2 November, 2016. The main objective of the competition was to highlight the importance of vigilance awareness in the Institute. A lecture was organized on 3 November, 2016 related to vigilance awareness in which keynote address was delivered by Shri Vijay Vate (IPS), former Addl. DGP, Govt of MP. Many other programmes in this context were also held in different schools of Bhopal.
ICAR Central Zone Sports Meet 2016 at IARI New Delhi

CIAE sports contingent consisting of sixty-four players participated in the ICAR Central Zone Sports Meet held at IARI, New Delhi during November 8-11, 2016 and secured the Runners up position in the overall medal tally. Er Swapnaja Jadhav won accolades by winning the Best Athlete of the Central Zone. The following players emerged victorious in the tournament. CIAE congratulates the sports persons for their commendable performance.

<table>
<thead>
<tr>
<th>1. Volleyball Smashing (Winners)</th>
<th>2. Volleyball shooting (Runners up)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ravindra Singh (Captain)</td>
<td>R Shaji (Captain)</td>
</tr>
<tr>
<td>K. Shaji (Vice Captain)</td>
<td>Ravindra Singh (Vice Captain)</td>
</tr>
<tr>
<td>R S Yadav</td>
<td>S K Bagde</td>
</tr>
<tr>
<td>R J Raina</td>
<td>P. L Jaison</td>
</tr>
<tr>
<td>A P Magar</td>
<td>Rais Khan</td>
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<tr>
<td>L K Manikpuri</td>
<td>SC Malviya</td>
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<tr>
<td>B M Nandede</td>
<td>Ramesh Imme</td>
</tr>
<tr>
<td>S K Bagde</td>
<td>Umesh Kumar</td>
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<tr>
<td>P L Jaison</td>
<td>Basant Verma</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>3. Table Tennis (Runners up)</th>
<th>4. Carrom</th>
</tr>
</thead>
<tbody>
<tr>
<td>CR Mehta (Captain)</td>
<td>RK Hedau (Gold Medal-Men)</td>
</tr>
<tr>
<td>RC Malviya (Vice Captain)</td>
<td>Asha Kudopa (Silver Medal-Women)</td>
</tr>
<tr>
<td>SK Shakalley</td>
<td></td>
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<tr>
<td>Mukhtar Ali</td>
<td></td>
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<td>Manoj Kumar (Statistics)</td>
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</tbody>
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<tr>
<th>5. Table Tennis, Women team event (Winner)</th>
<th>7. Table Tennis, Women individual event</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asha Kudopa (Captain)</td>
<td>Premlata Verma (Gold Medal</td>
</tr>
<tr>
<td>Premlata Verma</td>
<td>Asha Kudopa (Silver Medal)</td>
</tr>
<tr>
<td>Sweeti Kumari</td>
<td></td>
</tr>
</tbody>
</table>

| 8. Chess, Women, (Runners up): Sweeti Kumari (Silver Medal) |
| 9. Athletics (Women) |
| 10. Athletics (Men) |

| 100 m race                      | Swapnaja JadHAV (Gold Medal) |
| 200 m race                      | Swapnaja JadHAV (Gold Medal) |
| Long Jump                       | Swapnaja JadHAV (Gold Medal) |
| High Jump                       | Swapnaja JadHAV (Silver Medal)|
| Best Athlete of Central Zone    | Swapnaja JadHAV               |

| Shot-put                       | Chetan Sawant (Bronze Medal)   |
| 100 m race                     | Ashutosh Pandirwar (Silver Medal) |
| 200 m race                     | Ashutosh Pandirwar (Silver Medal) |
| 400 m race                     | Ashutosh Pandirwar (Silver Medal) |
| Cycle Race                     | RS Rajput (Gold Medal)         |
| Relay Race                     | Runners up                     |
Staff Promoted

Shri RS Yadav
Chief Technical Officer
wef 1 January, 2016

Shri Moolchandra
Asstt Chief Technical Officer
wef 27 October, 2015

Smt Dayarani Chellani
Technical officer
wef 1 June, 2016

Shri AK Bhardwaj
Technical officer
wef 29 June, 2016

Shri AR Yadav
Technical officer
wef 29 June, 2016

Shri JK Sahu
Technical officer
wef 29 June, 2016

Shri AP Marco
Sr Technical Assistant
wef 29 June, 2016

Shri CK Patel
Sr Technical Assistant
wef 29 June, 2016

Shri AK Pathak
Sr Technical Assistant
wef 29 June, 2016

Shri Umesh Kumar
Sr Technical Assistant
wef 29 June, 2016

Shri Rais Khan
Sr Technical Assistant
wef 29 June, 2016

Shri PL Jaison
Private Secretary
wef 1 October, 2016

Shri KG Rathi
Assistant Administrative Officer
wef 7 November, 2016
Our New Colleagues
The following scientists joined on 15 October, 2016 after completion of FOCARS:

Er Dilip Jat
Scientist (FMP)

Er Syed Imran S
Scientist (FMP)

Er Muzaffar Hassan
Scientist (Plant Biochemistry)

Dr Anand Rajwade
Scientist (LWME)

Dr S Balasubramanian joins as Dean

Dr S Balasubramanian, Principal Scientist was relieved on 28 October, 2016 to join as Dean, College of Fisheries Engineering at Tamil Nadu Fisheries University, Nagapattinam on deputation for two years wef 29 October, 2016.

CIAE bids adieu to superannuating staff
The following staff were superannuated from the Council's service. They were given a warm farewell. CIAE fraternity wishes them and their families a healthy and prosperous future.

October, 2016
- Shri RK Raina, Assistant Administrative Officer
- Shri KM Kharat, Technical Officer
- Shri RC Jivtode, Technical Officer
- Shri NP Johre, LDC

November, 2016
- Dr SD Kulkarni, Principal Scientist