



संवादपत्र NEWSLETTER

भाकृअनुप - केंद्रीय तटीय कृषि अनुसंधान संस्थान
(भारतीय कृषि अनुसंधान परिषद)

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(Indian Council of Agricultural Research)



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Director's Desk



Goa being an international tourist destination, there is ever-growing demand for floriculture products during various social, religious and other functions. Being located amidst Western Ghats, Goa has a rich diversity in genetic resources of ornamental crops. There is enormous genetic diversity in ornamental crops especially in traditional loose flower crops like *Crossandra* sp., *Jasminum auriculatum*, *Jasminum sambac*, *Chrysanthemums* sp., *Tagetes erecta*, *Michelia champaca* and *Gardenia jasminoides*. Due to the introduction of cut flowers, the cultivation of these flowers has come down. This has resulted in the loss of some precious germplasm and ICAR-CCARI initiated efforts to catalogue and conserve the ornamental crop germplasm resources of coastal region.

There is huge demand for cut flower crops like Gerbera, Anthurium, Gladiolus, Carnation, Liliun, Chrysanthemum, Roses, Orchid, Heliconia, Tuberosa, China aster and filler crops like Daisy, Baby's Breath, Golden rod and *Chrysanthemum*. and cut foliage like *Asparagus densiflorus 'sprengerii'*, Ferns, Palm leaves, Thuja, Cypress, Aralias, Cycas, Pleomele, Dracaena and Cordyline. Efforts at the institute to introduce and evaluate high yielding varieties of different ornamental crops like Gladiolus, Tuberosa etc under open field, Gerbera, Liliun etc under naturally ventilated polyhouses, Heliconia as intercrop in coconut plantations, and Orchids and Anthuriums under shade net were successful.

Nursery industry also has a great potential since there is a great demand for ornamental and decorative plants for landscaping. Efforts have been carried out at the institute to collect, conserve and mass propagate germplasm resources in ornamental foliage plants like ornamental coleus, caladiums, crotons, dieffenbachia, hibiscus, bougainvillea and other ornamental crops. Training and awareness on production technology of flower crops under polyhouse as well as open field, diversification in floriculture, value addition and ornamental nursery management have been initiated by the institute. Regular consultancy is provided on flower and foliage crop production systems in Goa, landscaping, value addition etc along with on farm visit for consultancy on flower and foliage crop production.



RESEARCH HIGHLIGHTS

Suitable banana variety for Areca based cropping system (V Arunachalam)

Areca (*Areca catechu* L.) is grown for masticatory use and is a major plant in Kulagars of Goa. The interspaces of areca gardens offer scope for inter cropping to generate additional income and employment. Hence this experiment was initiated with an objective of finding the suitability of banana variety for intercropping in areca garden. Seven banana varieties (Velchi, Amti, Rasbali, Myndoli, Robusta, Grand Naine, Red banana)

were evaluated in the interspaces of areca garden with four replications with a plot size of six banana plants. Each banana plant was planted in the inter space of four areca palms with the spacing of 2m x 2m. Plant height, collar girth, number of leaves, days to bunch initiation were recorded one year after planting. Velchi plants performed well in areca gardens and Red banana and Myndoli varieties were with slow growth and there was

Machine vision for phenotyping banana (V Arunachalam)

Machine vision is emerging as an important tool in reliable and rapid way for phenotyping. Image analysis of plant helps to identify its features. Seediness in banana is genetically controlled trait mainly in wild types. Half sib seedlings of a single plant from Ponda were used in the study. Progenies segregating for desirable traits form an important material for allele mining and phenotyping protocols for desirable traits of dwarf stature, tolerance to salinity and pests and diseases. About 135 seedlings were analysed using ten morphometric traits, on stem, leaf, root and the whole plant. One pest & one disease incidence data were also recorded. Images of individual seedlings of banana were also captured and analysed using a free image analysis software Digimizer (<https://www.digimizer.com>). Image and observations were recorded at 3 and 6 months of planting. Digimizer was

helpful in extracting new information such as leaf angle measurement.



Design modifications to naturally ventilated, aerodynamic greenhouses (MJ Gupta)

The suggested modifications to the aerodynamic naturally ventilated greenhouses to make them suitable for high rainfall, high humidity, moderate to high temperature coastal ecosystem viz., inner side wall, axial flow fans inside and ventilating fans, gutters on both sides and micro-sprinklers on the ridge were tested under the conditions of Goa with a tomato crop. It was found that the microclimate was greatly improved with more uniform microclimate maintained in the greenhouse and temperature up to 10.5°C lesser as compared to ambient air. The recommendations have been given to the state of Goa to modify their present structures for successful vegetable cultivation.



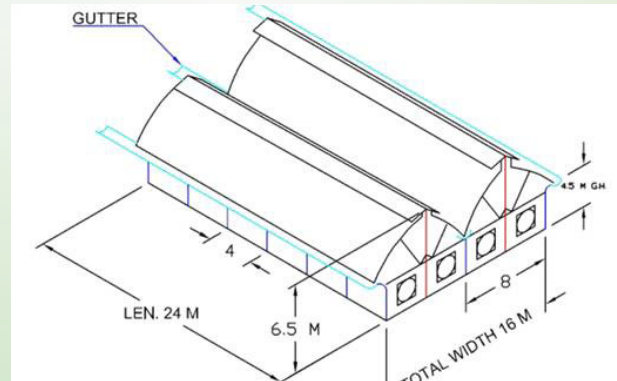
Greenhouse design for High rainfall regions of West Coast (MJ Gupta)

The designs of greenhouse suitable for high rainfall, high humidity, moderate to high temperature conditions of the west coast have been developed. The features of the design are:

- 1) Gable or Gothic arch roof with top vents with bevel and screw arrangement to open and close them
- 2) vertical sides with outward curvature and gutters to shade from incoming rainfall and convey the runoff from covers to collection drains
- 3) Provision of mixer fans for maintaining uniform microclimate across the length
- 4) Provision of exhaust fans with insect proof net on all openings for maintaining optimum air flow rates

within the greenhouse

- 5) Micro-sprinklers on the ridge for operation only during summer at timed intervals.



Standardization and evaluation of alginate formulation of bacterial bio-agent (R Ramesh)

Process of the production of sodium alginate formulation of bacterial bio-agent (*Bacillus methylotrophicus* Strain RCh6-2b) was standardized. Results indicated that 1% and 2% alginate beads could be developed. It was observed that the bacterium released from the beads into any medium in 24-72 hours. Further, it was noted that the sodium alginate beads were degradable in the soil and released the bacterium. The population of bacterium was over 7.0 Log CFU g⁻¹ of soil after 3 days of

application. Shelf life studies indicated that the bacterial population in the formulation was above 9.0 Log CFU g⁻¹ till one year. Spore population of *Bacillus* sp. (RCh6-2b) in the formulation after the same period indicated that most of the population is from the spores in the formulation. Evaluation of this formulation in tomato nursery indicated the improved plant growth parameters and further evaluation of alginate formulation in plant disease management were conducted.

Evaluation of Caladium types for landscape performance (Safeena SA)

A study was conducted to evaluate and identify different Caladium types based on landscape performance. At present, fifteen types of caladium have been collected, evaluated and maintained. The different types exhibited a remarkable level of diversity in leaf characteristics. Among the types, significant variations were observed for Plant Height, no. of Leaves, Length and Width of leaf, Petiole length and girth, Petiole colour, Leaf shape, Adaxial (upper) leaf surface colour, Abaxial (lower) leaf blade colour and other vegetative traits. Plant height, No. of Leaves, Length and Width of leaf, Petiole length and girth were ranged from 16.67cm (Red frill) - 47.00 cm (Red flash), 3.00 (Red frill) - 20.00 (Pink cloud), 11.00 cm (Heart delight)-

31.67 cm (Red flash), 9.20 cm (Dumbo)-23.17 cm (Red flash), 16.17 cm (Red frill)-46.50 cm (Red flash) and 16.14 mm (Heart delight)-21.19 mm (Torchy) respectively.



Analysis of soils from banana growing areas of Goa

(SR Maneesha and GR Mahajan)

Banana is a voracious feeder of nutrients, hence higher quantities of NPK are recommended for banana crop in all states. Banana growing areas of Goa were surveyed and soil samples were collected to analyze the soil conditions and the soil nutrient status. Soil pH (5.16) and EC (0.05 dS/m) showed that the soils are acidic with low electrical conductivity. Organic carbon content was high in both the districts (North

Goa 1.89% and South Goa 2.01%). Among the major nutrients, Nitrogen content is low (204.155 kg/ ha), Phosphorus content is medium (19.875 kg/ ha) and Potassium content is high (308.91 kg/ ha) in the state. Micro nutrient concentration was sufficient for Copper (0.36 ppm), Manganese (9.15 ppm) and Iron (6.1 ppm). But Goan soils are deficient in Zinc (0.325 ppm) and Boron (0.155 ppm).

Seed priming experiments in papaya

(SR Maneesha)

Seeds of local (Gauty) papaya were treated with CaNO_3 and KNO_3 at different levels (1%, 1.5% and 2 %) along with the control (water) to study the effect of Ca and K ions and their concentration in seed germination and seedling vigour. The lowest days taken for germination (4.33) and the highest germination percentage (82.56), shoot length (14.31 cm), fresh biomass (1.36 g) and dry biomass (0.174 g) were recorded for CaNO_3 1% treatment. In another

experiment, three varieties of papaya (Arka Surya, Arka Prabhat and Madhu bindhu) were treated with CaNO_3 at different levels (1%, 1.5% and 2 %) along with control. Arka Prabhat treated with CaNO_3 1% recorded the lowest number of days for germination with (4.75) and highest shoot length (25.2 cm). The experiment proved the significant effect Calcium ions in the papaya seed germination at low concentration.

Investigation of Classical Swine Fever Outbreak

(HB Chethan Kumar, N Shivasharanappa, Susitha Rajkumar, Sanjay Udharwar, EB Chakurkar)

An outbreak of Classical Swine Fever (CSF) in a pig farm located in Agassaim, Goa was investigated in the mid of August, 2016. The pigs of the age group from 3-5 months exhibited the symptoms of fever, anorexia, lethargy and mortality. The team visited the farm and collected clinical samples viz., blood, serum, nasal swabs from healthy and ailing pigs. The samples were sent to National Institute of Veterinary Epidemiology and Disease Informatics (NIVEDI), Bengaluru for diagnosis and it was found that samples were positive for CSF virus by polymerase chain reaction. The farmer was advised to vaccinate the pigs at regular intervals for CSF and to maintain strict biosecurity



MAJOR EVENTS

Institute organizes Clean India Mission programme

Owing to the importance of Clean India Mission lead by the Govt. of India, the Institute organised a cleanliness awareness programme on 16th May, 2016. The function started with a Swachhta Pledge at the institute and all the staff of the Institute and Krishi Vigyan Kendra (KVK) participated in the pledge taking ceremony. A pledge was taken for keeping the hygiene of their surroundings (residential area, office and experimental plots). Dr. Narendra Pratap Singh, Director of the institute emphasized that everybody should spend 100 hours in a year for the accomplishment of hygiene of our environment. He also mentioned that everybody should pass the message of personal and environmental hygiene to at least 100 people in their family and neighbourhood.



A talk on 4R nutrient stewardship in perennial crops

A talk on '4R nutrient stewardship in perennial crops' was delivered by Dr. AK Srivastava, Pr. Scientist, ICAR-CCRI, Nagpur on 30th May 2016. He focused on different aspects of citrus nutrition like nutrient constraints analysis of citrus orchards by developing DRIS-based soil-plant nutrient diagnostics, orchard efficiency modelling, targeted yield-based site specific nutrient management exploiting spatial variability in soil fertility, citrus rhizosphere specific microbial consortium and soil carbon loading, INM module, fertigation scheduling, nutrient mapping using geospatial tools, nutrient dynamic studies, transformation of soil microbial biomass nutrients within citrus rhizosphere and soil fertility map as decision support tool for fertilizer recommendation. Dr. NP Singh, Director, ICAR-CCARI welcomed Dr. Srivastava and explained the importance of the new concepts of nutrient management like with respect to west coast region of India. Dr. Srivastava urged the need for development of the newer and faster diagnostic tools for leaf tissue testing e.g. spectroscopy based nutrient detection.



Interface meeting with Developmental Departments, Govt. of Goa and other stakeholders

ICAR-CCARI, Old Goa organized Interface Meeting with Developmental Departments, Govt. of Goa and other stakeholders on 31st May 2016. Dr. NP Singh, Director, ICAR-CCARI briefly introduced about the Institute to the Chief Guest, Mr. Ashish Madhaorao More, Secretary (Agriculture) and the gathering. The secretary appreciated the organization for the event and told that such events would be useful for hand in hand progress of research and extension. He stressed upon technological interventions and their extension for improving livelihood of the farmers. Mr. Ulhas Pai Kakode, Director, Directorate of Agriculture explained action plan of the Directorate and apprised the agenda points submitted. The presentations on research achievements and new technologies developed were made by the Scientists of the Institute. It was then followed by the discussion on

the agenda points submitted by the Departments and other stakeholders for further action.



A talk on 'Post harvest management and value addition of horticulture produce'

Prof. (Dr.) RK Pal, Director, ICAR-NRC on Pomegranate, Solapur, Maharashtra delivered a guest lecture on 'Post harvest management and Value Addition in Horticultural Crops' on 3rd June, 2016. He illustrated simple storage and processing technologies for fruits and vegetables. He also emphasized upon the importance of Pomegranate, its nutritive value and its significance as a health crop and threw light on modern value added products of pomegranate. The guest speaker was honoured and felicitated by Dr. NP Singh, Director of the institute.



Annual Review Meeting of AICRP and Mega Seed Project on Pig

The Annual Review Meeting of ICAR - AICRP on Pig and Mega Seed Project was held from 6th to 7th June, 2016. Dr. NP Singh, Director, ICAR - CCARI welcomed the Chief Guest Shri. Francis D'souza, Deputy Chief Minister of Goa and other dignitaries, Dr. RS Gandhi (ADG AP&B, ICAR), Dr. DK Sarma (Director, NRC on Pig), Dr. Vineet Bhasin (PS, ICAR) and Dr. Santosh Desai, (Director, Dept. of AH&VS). Dr. NP Singh briefed about the activities and technologies developed by the Animal

Sciences Section at ICAR-CCARI. Dr. DK Sarma stressed upon the importance of pig production in the view of increasing demand of pork due to ever increasing human population. Dr. RS Gandhi elaborated on the importance of conservation of local germplasm. Dr. Santosh Desai threw light on the status of piggery in Goa and the different services provided by the Department of Animal Husbandry and Veterinary Services to the pig farmers. Deputy Chief Minister Shri. Francis D'souza



urged the scientists to characterize and multiply the local breeds of pigs which are more disease resistant than the exotic pigs. The Technical session was chaired by Dr RS Gandhi (ADG AP&B, ICAR), Dr DK Sarma (Director, NRC on Pig) and Dr Vineet Bhasin. The recommendations from the technical sessions were presented by Dr. S. Banik (PS, NRC on Pig) and Dr. NH Mohan (SS, NRC on Pig) . Dr. EB Chakurkar, Incharge Animal Science Section proposed the vote of thanks.



International Day of Yoga Celebrated at ICAR-CCARI

ICAR – CCARI celebrated International Day of Yoga on 21st June 2016. Dr. NP Singh, Director urged the employees to perform yoga regularly and adopt healthy lifestyle for better health and wellbeing. Later, Shri. Shailendra Gupta, Yoga Instructor addressed the gathering and delivered a talk on Yoga and its health benefits. He also made the gathering to perform eye exercises and explained how easy it is to perform simple asanas in the office itself.



ICAR-CCARI participated in one day workshop on black pepper cultivation

ICAR-CCARI participated in the one day workshop on black pepper cultivation at Ravindra Bhavan, Sakhali on 1st July 2016 organized by Department of Agriculture, Govt. of Goa. Shri. Pramod Sawant, Hon'ble MLA, Sakhali and Chairman, GSIDC was the chief guest of the programme. During inaugural session he urged farmers to seek information on advanced technologies on black pepper cultivation. Dr. NP Singh, Director, ICAR-CCARI, stressed on preparation of the action plan based on the crop calendar and to undertake such kinds of programme at different subdivisions. Technical presentations were made by Dr. R Ramesh, Principal Scientist (Plant Pathology) and Dr. Gopal Mahajan, Scientist (Soil Science) on disease management and nutrient management in black pepper respectively. Dr. Rajeev, Principal Scientist, ICAR-IISR, Calicut also made a presentation on different aspects of black pepper cultivation.



Farm Input Distribution Programme in Surla Village

ICAR-CCARI in collaboration with Surla Farming Co-operative Society distributed vegetable seeds like bottle gourd, ridge gourd, vokra, green leafy vegetable seeds like methi, dill and coriander, fertilisers- micro nutrients and arecanut seedlings to around fifty farmers by hands of Hon'ble MLA Shri. Pramod Sawant at Surla on 21st July, 2016. Mr. Viswanatha Reddy, K. Scientist- Agricultural Economics briefly introduced about the project on integrated farming system for improvement of nutrition and livelihood of farm women under different agro-ecosystems to the chief guest and gathering. Shri. Chidanand Prabhu, Programme Co-ordinator, In-charge of KVK, North Goa and Mr. Pramod Sawant, Hon'ble MLA, Sanquelim explained the action plans and schemes of Goa government regarding the development of agriculture. The presentation on feed and fodder management in Dairy Cattle was made by

Dr. Sanjaykumar Udharwar, Subject Matter Specialist, Animal Science. KVK, North Goa.



Meeting for initiation of weather based agromet advisory services

The institute organized meeting for initiation of weather based agromet advisory for Goa with Meteorological Centre, Goa on 29th July 2016. Dr. NP Singh, Director welcomed the gathering and gave a brief introduction about the weather based agromet advisory services. Presentation on different aspects of weather based agromet advisory services was delivered by Dr. Bappa Das, Scientist (Agricultural Meteorology). It was then followed by the discussion on the aspects of wide circulation of advisories and future course of action. The programme was attended by expert Scientists and PC, KVK of the Institute, officials from Meteorological Centre, Goa.



27th Institute Research Council meeting

The twenty seventh Institute Research Council (IRC) meeting of the Institute was held on 8th August 2016. The meeting was chaired by Dr. NP Singh, Director and he highlighted the significant points to be included and worked out as per the discussions in the Directors Conference and NRM Director's meet, etc. The scientists made their deliberations on research activities carried out during the last year and presented new research project proposals. The chairman appreciated the research accomplishments of the scientists and urged to make their research programmes more successful

keeping in view the coastal agriculture.



Independence day celebrations

The Institute celebrated 70th Independence Day on 15th August 2016. Dr. NP Singh, Director of the Institute hoisted the flag in presence of all the staff members and their families. Dr. NP Singh stressed on the working culture in the organization, and urged all the employees to strive hard to take the Institute to new heights in the field of research and extension. He also briefed about the achievements of the Institute and congratulated everyone for it.



Shree Satyanarayan Pooja

Shri Satya Narayan Puja was celebrated at the Institute on 19th August, 2016. The pooja was participated with pomp and fervor by all the staff of the Institute along with their family members, officials from nearby organisations and other people in the vicinity. The main objective of celebrating Satyanarayan Pooja was to seek blessings from the almighty and to maintain peace, harmony and working environment in the Institute.



21 Days Training programme on Nursery management in Horticultural Crops

A Training programme on “Nursery management in Horticultural Crops” was conducted for 21 days at the Institute from 2nd July, 2016 to 16th August, 2016 for B.Voc (Agriculture) trainees from RCPR School of Agriculture, Ponda, Goa. The objective of this programme was to develop the nursery management skills of the trainees through practical experiences and hands-on-training to various nursery activities. The theoretical sessions with various lecture topics were handled by Scientists of Horticulture Science Section. The practical sessions were handled by the Training Co-ordinators - Dr. Safeena SA, and Ms. Maneesha SR, Scientists, Horticulture Section. Dr. NP Singh, Director stressed on the importance of nursery management in horticultural crops with a preview of increasing demand of quality planting materials through his words. Dr. M. Thangam, Section-in-charge (Horticulture) emphasised the importance of nursery management and threw light on the scope of nursery industry in Goa. The trainee

representatives shared their experiences and specified the benefits gained from this training programme.



Farmer Training Programme on Artificial Insemination in Pigs

A two days training programme on “Artificial Insemination in Pigs” was organised from 17th to 18th August, 2016 at the Institute. This was a part of DBT Project-Augmentation of rural pig production for socio-economic upliftment of poor through Artificial Insemination. A total of 12 progressive farmers from Goa and Karnataka, attended this training program. Dr. E. B. Chakurkar, PI and Coordinator conducted the training. There were lectures on Scientific pig Farming, its importance, advance technologies in piggery, reproduction, AI in Pigs, hygiene in piggery and disease management. This was followed by the practical sessions where farmers were exposed to detect estrous and its various stages, perfect stage of estrus with respect to

undertake AI and also actual Artificial Insemination process. They were given hands on experience in doing AI. Demonstration on semen collection from boar and its processing was shown to the farmers.



Training programme on “Secondary livelihood opportunities in fisheries sector of Goa”

A three days training programme on “Secondary livelihood opportunities in fisheries sector of Goa” sponsored by NFDB was organised by the fisheries section of the Institute from 23rd to 25th August, 2016. A total of 32 participants from different parts of Goa participated in the programme. Mrs. Manju Lekshmi N and Sreekanth GB, Scientists, Fisheries Section coordinated the three days event. Lectures and hands on training in preparation of value added products from fish and shellfish, coastal aquaculture, aquarium construction and management and ornamental fish breeding and culture. The training ended with valuable inputs for the growth of coastal aquaculture, marketing of value added fish products and ornamental fisheries sector in Goa.



Canacona Tribal Farmers' Meet

A Tribal Farmers' Meet of Canacona was organized at the institute on 25th August, 2016 under Tribal Sub Plan Programme. Dr. NP Singh, Director gave introductory remarks about the programme and the benefits accrued by the tribal farming community in Goa. On this occasion Hon. Governor of Goa, Smt. Mridula Sinha addressed the farmer group delivering a vibrant message on importance of plants & the emotional relationship of mankind with plants.



During the meet, planting material of improved varieties of cashew (4000 grafts), mango (2000 grafts), coconut (600 hybrid seedlings), arecanut (650 seedlings), nutmeg (100 grafts) & black pepper (500 grafts & 1000 rooted cuttings) were distributed. The above material was provided to the tribal farmers of Cancona under the

TSP Project entitled “Technology intervention for higher productivity and production of important horticulture crops for improving livelihood security of tribal farmers in Goa” handled by Dr. AR Desai, Sr. Scientist (Horticulture).

Training Program on Hydroponic fodder production of Goa”

A National Training Program was organised at the Institute from 25th to 26th August, 2016. Participants from Goa, Maharashtra and Kerala attended the programme. Basics of hydroponic structure commercially installed as well as low cost structure attempted at Institute were explained. Participants have actually tried to grow the hydroponic fodder in hands-on training. This training was a part of RKVY project” Training, demonstration and research on hydroponic green fodder production” Dr. EB Chakurkar, PI and Coordinator conducted the training program.



Training programme on Value addition in Jackfruit

A series of training programmes were conducted to farm women on Value Addition in Jackfruit in ten different locations during June-August 2016 by Dr. S Priya Devi, Senior Scientist (Horticulture- Fruit Science) and Mrs. Sunetra Talaulikar, Subject Matter Specialist (Home Science), KVK. A total of 197 participants from Surla, Shiroda, Borim and Bethoda were participated in the training programme.



WORKSHOP/ SEMINAR/SYMPOSIA/ TRAINING

Date	Name of the Scientist	Programme	Venue
6 th May, 2016	Dr. SA Safeena	Goa State Medicinal Plant Board Meeting	Secretariat, Porvorim, Goa
19 th to 21 st May, 2016	Dr. V Arunachalam	XXV annual group meeting of AICRP on Palms	ICAR-CPCRI, Kasaragod, Kerala
6 th June, 2016	Dr. SA Safeena	44 th PSC Meeting of National Medicinal Plant Board	Ayush Bhawan, New Delhi
28 th June, 2016	Dr. NP Singh	State Level Project Scrutiny Committee meeting	Krishi Bhavan, Tonca, Goa
1 st July, 2016	Dr. NP Singh	One day workshop on black pepper cultivation	Ravindra Bhavan, Sakhali, Goa
7 th to 8 th July, 2016	Dr. R Ramesh	AMAAS project review workshop	NASC complex, New Delhi
22 nd to 23 rd July, 2016	Dr. NP Singh	Interactive meet on Plantation based cropping system for improving livelihood security	ICAR-CPCRI, Kasaragod, Kerala
29 th July, 2016	Dr. V Arunachalam	Kshitij 2016 Seminar on Science & Engineering for Sustainable Development	Don Bosco College of Engineering, Margao, Goa
8 th August, 2016	Dr. NP Singh	Goa State Medicinal Plant Board Meeting	Secretariat, Porvorim, Goa

PERSONALIA

Transfer to ICAR-CCARI -

1. Dr. Gokuldas PP, Scientist (Animal Reproduction & Gynaecology) transferred to ICAR-CCARI from ICAR-NRC for Pig, Guwahati on 16-5-2016.

Retirement

1) Shri P Rajendran, Administrative Officer of ICAR-CCARI superannuated on 31-08-16

Transfer from ICAR-CCARI

1) Shri Raghurama Kukkude, Sr. Technical Officer transferred to ICAR-DCR, Puttur on 08-07-2016.

