



काजू समाचार CASHEW NEWS

काजू अनुसंधान निर्देशालय, पुत्तूर : अर्धवार्षिक वार्ता पत्र

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FROM THE DIRECTOR'S DESK

Micronutrients in Cashew

The importance and need for application of micronutrients has been realized during the past three decades when widespread micronutrient deficiencies were noticed in most of the Indian soils under intensive agriculture. Currently, about 47.0, 11.5, 4.8 and 4.0 per cent of soils in India were reported to be deficient in Zn, Fe, Cu and Mn, respectively. Infact essential micronutrients (Zn, Cu, Fe, Mn, B, Mo, Ni and Cl) are needed by plants in very small quantities and mainly function as components of a series of enzymes. Deficiency or toxicity of these elements in soil adversely affects the growth and development of plants. Cashew, being a perennial crop requires both macro and micronutrients during various growth stages for optimum production. The micronutrient deficiencies has often been observed in cashew plantations due to limited or no use of organic manures, use of chemical fertilizers to supply only major nutrients, losses of micronutrients through leaching, soil erosion, use of marginal lands/degraded lands for cashew cultivation etc. Now the demand of micronutrients is increasing due to



intensive cropping and use of high yielding cashew varieties.

Cashew is grown on a diverse range of soils, from the sandy seacoast to laterite hill slopes, pure sandy soils to sandy loam, laterite soil, deep loam and red latosols, but many of these soils have low effective cation exchange capacities and low exchangeable base status. Majority of the soils growing cashew in India are lateritic, red and coastal sands which are acidic in nature and poor in soil fertility. The runoff and soil erosion are very high in steep slopes. Micronutrient deficiency may also be attributed to nature of parent material, coarse soil

texture and nature of soil reaction. Among micronutrients, deficiencies of Zn, B and Mo are more likely common in acid soils. Fe and Al toxicity is a distinct problem. Micronutrient deficiencies in soil not only limit the cashew crop production but it also has negative effects on human health. In a survey of 33 cashew orchards in Dakshina Kannada district of Karnataka, made by DCR, Puttur, 88 per cent soils were found deficient in B followed by Zn (75.8 %) while Fe, Mn and Cu were found sufficient. Presently, out of eight micronutrients, the deficiencies of three micronutrients are becoming constraints in cashew growing soils.

Continuous removal of micronutrients from soil by the cashew plant reduces the concentration of micronutrients in soil solution, thereby adversely affecting normal growth. It has been reported that the micronutrient requirement to produce one kg of cashewnut was 525.7 mg Fe, 63.6 mg Mn, 87.8 mg Zn and 26.5 mg Cu per tree. In a study in Australia, eight year old cashew tree removes 2.12 g Fe, 343 mg Mn, 390 mg Zn and 130 mg Cu. The removal of micronutrients have to be restored through chemical fertilizers and/or organic manures to maintain soil health for efficient and sustainable cashew productivity. It is imperative that level of micronutrients in soil and plant should be optimum for growth and development since the micronutrients' need is site specific. It is very difficult to generalize on the soil management practices needed for maintaining sufficient levels of micronutrients in the cashew growing soils. The deficiency and toxicity limits of micronutrients in plant are rather narrow. This calls for location specific management of micronutrients in cashew so that these do not become toxic to plant.


Information in India relating to micronutrient deficiency/toxicity symptoms in cashew has not progressed much. Researchers grouped the micronutrients into three groups viz., (a) Fe and Mo deficiency, of which proved lethal during the trial in the order of severity, (b) Mn and Zn deficiency, symptoms of which developed early but were not lethal and (c) B and Cu deficiency, symptoms which developed slowly and were not severe in their effects. Sixteen varieties tested for micronutrient content in the index leaf (4th and 5th leaf from tip of matured branches) collected from 10 years old trees at DCR, Puttur, indicated that the demand for micronutrients differ with varieties. Out of 16 varieties, 14 varieties were deficient in Zn whereas, all varieties were sufficient in Fe, Mn and Cu. The critical nutrient norms for the fruit crops have very well established, however, the information available on cashew is negligible. Absence of a suitable soil and plant test norms in relation to optimum nut yield hampers the timely diagnosis of causes for low productivity of cashew. Thus, research on development of critical nutrient norms in soils and leaf of cashew is of paramount importance.

Micronutrient management options need to be worked out to enhance the yield and quality of cashew. In fruit crops, though soil and foliar application of micronutrients are considered equally effective but foliar application of the nutrients is obviously an ideal way of evading the problems of micronutrient availability. Foliar application is based on the principle that the nutrients are quickly absorbed by leaves and transported to different parts of the plant to fulfill the functional requirement of nutrition particularly in improving the fruit set and productivity. Researchers reported that

foliar sprays of Zn and Cu at the emergence of the flush, panicle initiation and fruit set stages ensure better fruit set and also enhance nut yield in cashew. Yellow leaf spot in low soil pH (4.5-5.0) could be corrected by foliar sprays of Mo salts. However, no systematic research work has been carried out in cashew for improving fruit set, nut drop, yield and quality of cashew by foliar spray of micronutrients. Studies conducted at Directorate of Cashew Research (DCR), Puttur showed that foliar spray of secondary and micronutrients had positive significant effects on the number of bisexual flowers/panicle, number of panicles/tree, number of nuts/tree and nut yield/tree over unsprayed plants.

To minimize widespread deficiency of micronutrients, it would be the best option to incorporate them into macronutrient fertilizer sources like urea, diammonium phosphate, muriate of potash etc. which

facilitates to apply small quantity of micronutrient fertilizers over a large field area in a uniform manner. In spray applications, micronutrients may also be mixed with plant protection chemicals besides macronutrients to reduce the cost of application. To formulate nutrient and pesticide spray combinations, compatibility, possible reaction of products as well as solubility properties need prior investigations in depth. Integrated nutrient management practices involving conjoint application of chemical fertilizers, organic manures/ green manuring and biofertilizers, recycling of cashew litter, use of microbial inoculants for mobilizing micronutrients from slowly available soil pools and foliar nutrient spray are some of the strategies to manage micronutrient constraints in cashew.


(P.L. Saroj)
Director

FOCUS ON RESEARCH

Efficacy and virulence of entomopathogenic nematodes on larval stages of cashew stem and root borers, *Plocaederus* spp. and *Batocera rufomaculata*

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Cashew crop is infested by more than 135 insect pests, of these pests, three species of cerambycids, commonly referred to as cashew stem and root borers (CSRB); *Plocaederus ferrugineus* L., *Plocaederus obesus* Gahan and *Batocera rufomaculata* De Geer (Coleoptera: Cerambycidae) make extensive irregular tunneling in the bark of stem and roots which hinders translocation of water and nutrients causing gradual death of the yielding trees. The pest is reported to be a major pest from India, Africa, Nigeria, China, Cambodia and Vietnam. Significant reduction in the nut productivity due to loss in tree population as a result of CSRB

infestation has been reported from this Directorate. The currently recommended practice for managing the CSRB incidence is by physical removal of pest stages from infested trees followed by swabbing and drenching the treated portion of main stem and roots with chlorpyrifos (0.2%), as well as removal of dead and CSRB infested trees beyond recovery (i.e. having yellowing of foliage and or more than 50 per cent of bark circumference damaged) from the cashew plantations. Due to global concern regarding possible occurrence of pesticide residues in cashew kernels, importance is being given for evaluating eco-friendly pest

management techniques for managing insect pests of cashew. Of these, use of entomopathogenic nematodes (EPN) is an option that is environmentally compatible and does not affect the non-target organisms. Among the EPN genera, *Steinernema* and *Heterorhabditis* have been extensively reported to control a variety of insect pests. The present study was undertaken with the objectives of determining susceptibility of CSRB grubs to various species of EPN and to determine the survival ability of these EPN spp.

Determination of susceptibility of CSRB to different species of EPN

Laboratory experiments were undertaken at DCR, Puttur to evaluate the virulence and susceptibility of EPN against the CSRB, *Plocaederus ferrugineus* Linn., *P. obesus* Gahan and *Batocera rufomaculata* De Geer. The grubs of *Plocaederus* spp. and *Batocera rufomaculata* collected from infested trees were reared individually on cashew bark in rearing bottles as per the rearing technique standardized at DCR, Puttur and were used for evaluating the virulence of three spp. of EPN viz., *Heterorhabditis indica*, *Steinernema abbasi* and *Steinernema bicornutum*. The pure cultures of these EPN species were obtained from National Bureau of Agriculturally Important Insects (NBAIL), Bengaluru and were regularly multiplied on larvae of greater wax moth, *Galleria mellonella*. Full grown larvae of *G. mellonella* obtained from laboratory cultures were allowed to crawl for 24 h in a Petri plate (160 mm) having moist filter paper inoculated with the infective juveniles (IJs) of a known EPN species. The infected wax moth larvae were placed on a moistened filter paper spread on an inverted watch glass, placed in covered Petri plates. Nematode IJs emerging from these cadavers were harvested after 5-7 days, by gently washing the edges of the watch glass with reverse osmosis (R.O.) water and were

stored at room temperature till further evaluation.

For evaluating the susceptibility of the CSRB grubs, IJ suspension of a known species of EPN was spread evenly in Petri plates. The test CSRB grubs were allowed to crawl in these Petri plates for infection by the IJs for 12 h. Duration for mortality of treated CSRB grubs (in days) was recorded. The dead CSRB grubs were transferred on to an inverted watch glass covered with a moistened filter paper to prevent dehydration and to promote development of nematode IJs. The virulence of EPN species emerging from these CSRB cadavers were checked by inoculating the emerged IJs on to wax moth larvae.

The results indicated that among the three species of EPN tested, *Steinernema* species had higher virulence on *Plocaederus* species, while, *Heterorhabditis indica* had a higher virulence on *Batocera*



EPN infected CSRB cadaver

rufomaculata. The mean duration for mortality was significantly lesser in the laboratory reared younger grubs of *Plocaederus* compared to the mortality observed in case of field collected grubs of CSRB in all three treatments of EPN. The mean duration of mortality of the laboratory reared younger grubs of *Plocaederus* with respect to the three species of EPN was on par and was significantly lesser (5.25-5.75 days) than the mean duration of mortality observed in case of field collected grubs

(7.42-18.25 days). *Steinernema abbasi* and *S. bicornutum* showed higher virulence on field collected grubs of *Plocaederus*, wherein the duration of mortality was 12.88 and 12.37 days, respectively, while, *Heterorhabditis indica* required a longer mean duration (14.11 days) to induce mortality. The grubs of *Batocera rufomaculata* showed higher susceptibility to

Heterorhabditis indica, with a shorter mean duration of mortality (7.42 days), while *Steinernema bicornutum* and *S. abbasi* needed longer mean durations of 17.94 and 18.25 days, respectively for inducing grub mortality. Hence, both *Plocaederus* and *Batocera* exhibited differential susceptibility to all the three species of EPN (Table 1).

Table 1. Mean duration for mortality induction in CSRB grubs by different species of EPN

EPN Species	Mean duration (in days) for mortality in case of			
	<i>Plocaederus</i> spp. (Lab. reared grubs)	<i>Plocaederus</i> spp. (Field collected grubs)	<i>Batocera rufomaculata</i> (Field collected grubs)	Untreated control
<i>Heterorhabditis indica</i>	5.25 a (4-6)	14.11 bc (8-17)	7.42 a (4-10)	0.00 d
<i>Steinernema abbasi</i>	5.75 a (5-8)	12.88 b (11-27)	18.25 c (13-19)	0.00 d
<i>Steinernema bicornutum</i>	5.45 a (3-8)	12.37 b (9-19)	17.94 c (15-23)	0.00 d
CD (p=0.001): Main group = 3.442; Sub group = 3.560				

Figures in the parenthesis indicate range in the duration of mortality

Figures followed by common alphabets indicate that the treatments were on par

Determination of persistence of the EPN spp. in soils of cashew ecosystem

Soil samples were collected from the experimental cashew plots of this Directorate and filled into earthen pots at 5 kg per pot and placed in a net house. The soils were sandy loam with pH 5.74 and EC 0.017 dS m⁻¹. The IJs of the three different species of EPN viz., *Heterorhabditis indica*, *Steinernema abbasi* and *Steinernema bicornutum* cultured on wax moth larvae, were inoculated to individual earthen pots; at approximately 50,000 IJs per pot. Soil moisture was maintained by sprinkling clean water (500 ml/pot) twice a week. The survival and virulence of EPN in the soil was checked by baiting with the final instar larvae of *G. mellonella*. For this purpose, soil samples (100 g) were collected from all the three EPN

inoculated earthen pots at 5, 10, 15, 30, 60, 90, 120 and 150 days after inoculation from different soil depths (5, 15 and 30 cm) from each pot and were mixed and spread in separate glass troughs. Final instar larvae of *G. mellonella* (20 nos.) were released to crawl in these troughs for 24 h. They were removed and placed in Petri plates with moistened filter paper for observing induction of mortality due to infection by EPN and the percentage mortality was calculated. The dead larvae of *G. mellonella* were checked daily for emergence of IJs from the cadavers. The virulence of second generation IJs emerging from the dead wax moth larvae was verified by inoculating the IJs to the later larval instars of wax moth.

The mean mortality levels reduced considerably beyond 15 days after treatment

(DAT) in case of all species of EPN. The mean percentage mortality of wax moth larvae used as bait was 100 per cent up to 10 DAT, while it was more than 50 per cent up to 15 DAT. Both the species of *Steinernema* induced more than 50 per cent mean mortality of bait insect up to 60 DAT while, the mean mortality in case of *Heterorhabditis indica* was 19.33 per cent at 60 DAT. It was observed that *Steinernema bicornutum* induced more than 50 per cent mean mortality of the bait species even after 150 DAT. *Heterorhabditis indica* and *Steinernema abbasi* could survive beyond 90 DAT, but the number of virulent IJs was found to reduce drastically beyond 30 DAT as indicated by the low level of mean mortality induced in the bait insect larvae. The mean percentage mortality of larvae of wax moth at 150 DAT was 8.33 in case of *H. indica* and 9.33 in case of *S. abbasi*, which was significantly lower in comparison to the mean percentage mortality of wax moth larvae induced by *S. bicornutum* (57.92). (Fig. 1) The mean percentage mortality of wax moth larvae was insignificant beyond 150 DAT.

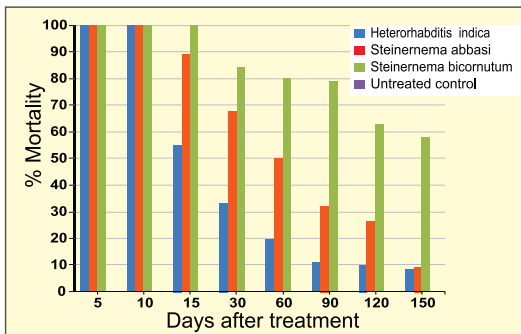
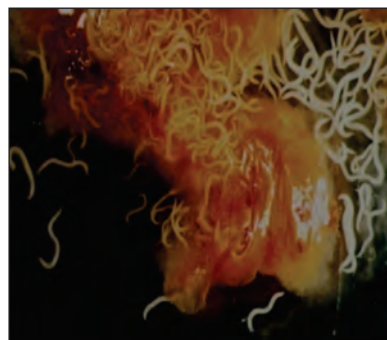


Fig 1. Persistence of different EPN species in soil under simulated conditions

It was noticed that in all the EPN treatments, the second generation of IJs emerging from dead bait insect larvae could induce 90 per cent to 100 per cent mortality of freshly treated wax moth larvae within 48 h after treatment indicating the continuance of

virulence in the EPN IJs. This indicated that the reduction in the mortality of bait insects, released was not due to loss of the virulence in the EPN IJs applied to the soil, but due to reduction in number of virulent IJs. However, those IJs which survived in the soil could produce virulent and more numbers of IJs when subsequently treated to a host species (both wax moth and CSRB). Out of the three EPN species tested for survival ability in the soil, *Steinernema bicornutum* showed significantly longest duration of survival in comparison with *S. abbasi* and *Heterorhabditis indica*. Survival of all the three species of EPN was on par up to 10 DAT but later on, there was significant and gradual reduction in the number of virulent IJs in the soil; which was found to vary significantly among the three EPN species.

The results of the present study indicated that both *Plocaederus* and *Batocera* exhibited differential susceptibility to all the three species of EPN. Among the three species of EPN evaluated, *Steinernema bicornutum* showed significantly longest duration of survival up to 150 days indicating its potential as a biological control agent for management of CSRB. The findings of these trials will help in further investigations for utilizing EPN in the integrated pest management schedule for the cashew stem and root borers.



Dissected body of CSRB grub showing emerged EPN

PROGRAMMES ORGANIZED

Interactive Meeting on Quality Standards for Raw Cashewnuts

An Interactive meeting on 'Quality standards for raw cashew nuts' was organized at DCR on 28 August 2013 in collaboration with Directorate of Cashewnut and Cocoa Development (DCCD), Kochi. Representatives of cashew processing industry, officials from DCCD, scientists of DCR and various AICRP-Cashew centres participated in the meeting. Prof. P.L. Saroj, Director, DCR in his opening remarks highlighted the urgent need for developing quality standards for raw cashewnuts which will help both producers and processors alike. He briefed about the present status of cashew cultivation and processing standards in India. He extended research support from the Directorate towards a project for finalizing the quality standards. Shri. Venkatesh N. Hubballi, Director, DCCD extended monetary support for a project to standardize the quality standards. He requested the house to have an interaction based on the concept note prepared by Dr. D. Balasubramanian, Principal Scientist, DCR.



Dr. D. Balasubramanian presented the concept note on 'Quality standards for raw cashew nuts'. In the beginning, the rationale for the development of quality standards for

raw cashewnuts was explained by him. Besides, the role of various stakeholders in the value chain of cashew viz., cashew growers, traders and processors in assessing the quality and current methodology being followed were described. The applicability of 'Agmark Standards' in the present scenario and its drawbacks were outlined. As a part of research project to be taken up at this Directorate, factors influencing quality of raw cashewnuts, importance of sampling technique to be adopted, process suitability of raw cashewnuts, importance of sampling technique to be adopted, process suitability of raw cashewnuts, objectives of the project, role of moisture content of raw cashewnuts and development of price structure for raw cashewnuts were delineated.

Shri. K. Sudhakar Kamath, President, Karnataka Cashew Manufacturers Association; Shri. G. Giridhar Prabhu, Ex-President, Karnataka Cashew Manufacturers Association and Shri. P. Subraya Pai interacted on the concept note and shared concerns and expectations of the cashew industry. Shri. G. Giridhar Prabhu informed that industry needs 170-190 nut counts which will yield 24-25 per cent. There should be a maximum of only 10-15 per cent immature nuts. The nuts for industry purpose should have proper drying of three days which provides perfect white colour to the kernels during processing. They also highlighted on a framework for future action in this project and extended support of industry.

Dr. Jnanadevan, Joint Director, DCCD and scientists from DCR and AICRP-Cashew Centres also interacted along with the industrialists and provided valuable suggestions towards refining the concept note. Issues related to instrumentation,

awareness among producers, preparation of literature on harvesting and post harvest techniques and need for analyzing farmers' opinion on quality standards were also discussed during the meeting. It was decided that Dr. D. Balasubramanian will prepare a project proposal based on the concept note and submit the same to DCCD for funding.

Awareness cum Training Programme on Protection of Plant Varieties and Farmers' Rights Act

Awareness cum Training Programme on 'Protection of Plant Varieties and Farmers' Rights Act' (PPV&FRA) was organized at DCR, Puttur on 21 December 2013 under sponsorship of PPV&FRA, New Delhi. About 100 cashew farmers from Dakshina Kannada district of Karnataka participated in the programme. The programme was inaugurated by the Chief Guest Dr. George V. Thomas, Director, CPCRI, Kasaragod. In his inaugural address, Dr. George V. Thomas explained in detail the role of Protection of Plant Varieties and Farmer's Rights Authority, overview of PPV&FRA and importance of the act for farming communities and plant breeders. On this occasion, DCR Calendar 2014 was released



by the Chief Guest. Prof. P.L. Saroj, Director, DCR delivered the presidential address. In his presidential address, Prof. Saroj appraised farmers about various aspects of



biodiversity and importance of its conservation. He urged the farmers to understand and make full use of their rights under the PPV&FRA, which protect the right of farmers, breeders and promote them to develop new varieties.

Dr M.G. Nayak, Principal Scientist, DCR delivered lecture on 'Farmers rights and DUS testing guidelines in cashew'. He stressed on access to seed, benefit sharing, compensation and other rights under the act. He also dwelt on DUS testing guidelines for cashew along with major 23 characters and how to compare new varieties with the existing ones. Dr. M.R. Dinesh, Principal Scientist, IIHR, Bengaluru briefed about the 'Guidelines for DUS testing and plant variety development in mango, guava, papaya and custard apple'. He also explained the role of farmers and breeders in conservation, improving and developing plant varieties, registration of plant varieties and benefits of registration. Dr. V. Niral, Principal Scientist, CPCRI, Kasaragod presented the guidelines for DUS testing in coconut. She explained about onsite DUS testing facility for coconut farmers and various characters used for testing. A farmer-scientist interaction followed where various aspects of DUS testing, registration of plant varieties, breeders rights and farmers rights, procedures in PPV&FRA etc. were discussed.

MEETINGS

राजभाषा हिन्दी कार्यक्रम

इन छह महीनो में काजू अनुसंधान निर्देशालय में हिन्दी कार्यान्वयन समिति की एक तिमाही बैठक का आयोजन किया गया। बैठक में कार्यालय में हो रही गतिविधियों के बारे में विचार – विमर्श कर आवश्यक सूचना समिति सदस्यों को दी गई। वार्षिक गतिविधियों के अनुसार आवश्यक लक्ष्य प्राप्ति के लिए जरूरी कदम उठाने से संवन्धित चर्चा की गयी।

जुलाई महीने में पुत्तूर नराकास की 24 वीं अर्ध वार्षिक बैठक का आयोजन किया गया। जिसमें विभिन्न सदस्य कार्यालयों के प्रधान उपस्थिति थे। उसी दिन सुबह से दोपहर तक सदस्यों के लिए हिन्दी कार्यशाला का आयोजन किया गया। कार्यशाला में निर्देशालय के सभी कर्मचारियों सहित विभिन्न सदस्य कार्यालयों से 45 कर्मचारियों ने भाग लिया।

विगत वर्षों की तरह सितंबर 14 से 28 तक हिन्दी पखवाड़ा मनाया गया। पखवाड़ा के उद्घाटन समारोह में प्रो. वी. मुरलीधर नायक, हिन्दी प्राध्यापक तथा विभागाध्यक्ष, मंगलोर विश्वविद्यालय, मुख्य अतिथि के रूप में उपस्थिति थे। पखवाड़ा के अवसर पर



कर्मचारियों के लिए विभिन्न प्रतियोगिताओं का आयोजन किया गया। पखवाड़ा का समापन प्रो. पी. एल. सरोज, अध्यक्ष, पुत्तूर नगर राजभाषा एवं निर्देशक, डी. सी. आर., पुत्तूर की अध्यक्षता में हुआ। विभिन्न प्रतियोगिताओं में विजेता कर्मचारियों को पुरुस्कृत

किया गया। हिन्दी भाषा में कार्य करने वाले कर्मचारियों को नगद पुरस्कार से सम्मानित किया गया। दिनांक 16-12-2013 को निर्देशालय के कर्मचारियों के लिए हिन्दी कार्यशाला का आयोजन किया गया।

Institute Research Committee (IRC) Meeting

The 26th IRC meeting of DCR was held during 23-24 July 2013 under the Chairmanship of Prof. P.L. Saroj, Director, DCR. Dr. Mohana, G.S., Senior Scientist and Member Secretary welcomed the experts and scientists. Prof. P.L. Saroj, in his introductory remarks indicated the importance of IRC meeting and the need for in-depth deliberations to be made in research projects. Dr. Mohana, G.S., presented the general recommendations and Action Taken Report of 16th RAC and 25th IRC meetings. There were technical sessions on “Crop Improvement” chaired by Dr. K. Nirmal Babu, Project Coordinator, All India Coordinated Research Project on Spices, Indian Institute of Spices Research, Kozhikode, Kerala; “Crop Management” chaired by Dr. R. Chithirachelvan, Principal Scientist & Head, Division of Fruit Crops, IIHR, Bengaluru; “Crop Protection” chaired by Dr. R. Asokan, Principal Scientist, Division of Biotechnology, IIHR, Bengaluru; “Post Harvest Technology” Chaired by Dr. Nayansingh Thakor, Professor and Head, Department of Agril. Engineering, Dr. Balasaheb Sawanath Konkan Krishi Vidyapeeth, Dapoli, Maharashtra and, “Transfer of Technology” chaired by Prof. P.L. Saroj, Director, DCR. The scientists of the Directorate presented progress made under various projects and technical programme of all the projects was finalized.

Vigilance Awareness Week

Vigilance Awareness Week 2013 was observed at DCR, Puttur from 28 October to

2 November 2013 with the theme for this year as selected by the Central Vigilance Commission "Promoting Good Governance-Positive Contribution of Vigilance". The observance of the Vigilance Awareness Week commenced with a pledge administered by Prof. P.L. Saroj, Director, DCR to all the employees of the Directorate on 28 October 2013. Dr. Mohana G.S., Senior Scientist read the messages from President and Vice-President of India and also explained the importance of truthfulness in all spheres of official activities. On 1 November 2013, Shri. K.R. Achar, Advocate, Civil Court, Puttur delivered a talk on "Promoting Good Governance – Positive



Contribution of Vigilance". He briefed about the Central Vigilance Commission Act -2013 and its role in eliminating corruption in the

society. He emphasized upon the role of head in leading the organization and the role of vigilance in promoting leadership. He stressed the need for everyone to be vigilant in performing day to day official activities. On this occasion, Prof. P.L. Saroj, Director, presided over the programme and urged all the employees to cooperate in containing corruption. Dr. P. Shivarama Bhat, Principal Scientist and Vigilance Officer, DCR was also present.

Institute Management Committee (IMC) Meeting

The 39th meeting of the IMC was held on 23 December 2013 under the Chairmanship of Prof. P.L. Saroj, Director, DCR, Puttur. The Chairman informed the members about research and achievements of the Directorate. Various administrative and financial matters were discussed and finalized. Dr. K.V. Bhat, Head, DNA Fingerprinting, National Bureau of Plant Genetic Resources, New Delhi; Shri. Padmanabhan, Special Officer (Cashew), Kerala State; Dr. Ramanathan, Principal Scientist, Central Tuber Crops Research Institute, Thiruvananthapuram; Dr. T.N. Raviprasad and Dr. P.S. Bhat, Principal Scientists, DCR; Shri. R. Arulmony, AF&AO In-charge and Shri. K.M. Lingaraja, Administrative Officer In-charge, DCR attended the meeting.

TRANSFER OF TECHNOLOGY

Training Programmes

A two days training programme on 'Integrated Pest Management in Cashew' was organized at DCR under sponsorship of KVK, Kasaragod for project staff of State Planning Board, Kerala during 18-19 November 2013. Prof. P.L. Saroj, Director, DCR inaugurated the programme. In his address, Prof. Saroj highlighted the importance of integrated pest management in cashew in the context of Eco-friendly soil and plant health management. Dr. P.S. Bhat,

Principal scientist (Agril. Entomology), DCR briefed about the objectives of the



programme and said that the purpose of the training programme is to enlighten the cashew farmers about non-chemical pest management. Experts from Agril. Entomology of DCR delivered lectures/practical demonstrations on various topics such as 'Management of tea mosquito bug', 'cashew stem and root borer, minor pests and diseases in cashew in the training programme.

Exhibitions / Demonstrations

- 9-12 July 2013 - Central Tuber Crops Research Institute (CTCRI) Golden Jubilee International Conference and Exhibition organized at CTCRI,



Thiruvananthapuram, Kerala. This Directorate put up stall to display various cashew production and processing technologies to the farmers.

- 22-24 November 2013 – Horticulture Mela organized at University of Horticultural Sciences (UHS), Bagalkot, Karnataka. This Directorate



put up stall to display various cashew production and processing technologies to the farmers.

- 27-29 November 2013 – Symposium on Spices and Aromatic Crops - VII organized at Regional Station of Indian Institute of Spices Research, Cardamom Research Centre, Appangala, Karnataka. This Directorate put up stall to display various cashew production and processing technologies to the farmers.
- 16-17 December 2013 - National Conference on Biodiversity at St. Philomena College, Puttur, Karnataka. This Directorate put up stall to display various cashew production and processing technologies to the students and participants.
- The demonstration plots established in farmers' fields at Puttur, Sullia and Bantwal taluks of Dakshina Kannada district of Karnataka with the financial support of National Horticulture Mission of Directorate of Cashewnut and Cocoa Development, Kochi were monitored



regularly by the Scientists of this Directorate during the period and technical advice was given as and when required.

Exposure visit to DCR

Several individual visitors and visitors in batches including farmers, students and

officials to the Directorate were taken to various experimental plots, cashew nurseries, cashew museum and

laboratories and were appraised of the achievements and technologies developed by DCR.

Visitors Category	Organization	No. of Participants	Date of Visit
Farmers	Kadamba Service Co-operative Society, Sirsi, Karnataka	20	19 October 2013
Students	University of Agricultural Sciences, Raichur, Karnataka	100 (4 batches)	11 November 2013
Project staff	State Planning Board, Kerala	08	18 November 2013
Students	University of Agricultural Sciences, Bengaluru, Karnataka	50 (2 batches)	10 December 2013
Students	Mangalore University, Karnataka	10	11 December 2013
Farmers	Dakshina Kannada district, Karnataka	70	21 December 2013

Supply of Planting Material

More than 1,00,000 cashew grafts of high yielding and recommended varieties were produced under two different revolving fund schemes viz., Mega Seed Project and

DCCD Revolving Fund besides the graft production under Institute Revenue Generation programme. Cashew grafts have been supplied to the farmers and developmental agencies.

STAFF NEWS

Promotions

- Shri. K. Muralikrishna, Asst. Chief Technical Officer - Promoted as Chief Technical Officer w.e.f. 6 March 2010.
- Shri. P. Abdulla, Asst. Chief Technical Officer - Promoted as Chief Technical Officer w.e.f. 21 July 2011.

Retirements

- Shri. A. Poovappa Gowda, Technical

Officer (T-5) - Superannuated on 31 August 2013.

- Shri. S. Krishnappa, Skilled Support Staff - Superannuated on 31 December 2013.

Awards / Honours / Recognitions

- Dr. J.D. Adiga, Senior Scientist (Horticulture) - Nominated as Assistant Editor of *Corn*, *The Journal of Floriculture*, Jammu.

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