



# काजू समाचार CASHEW NEWS

काजू अनुसंधान निदेशालय, पुत्तूर के अर्धवार्षिक वार्ता पत्र

HALF YEARLY NEWSLETTER OF DIRECTORATE OF CASHEW RESEARCH, PUTTUR

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## FROM THE DIRECTOR'S DESK

India has the largest area under cashew and stands as the second largest producer of cashew in the world. Vietnam, Ivory Coast and Brazil are the competitors to India for cashew production and export. However, in India, the large number of cashew processing units need about 13-14 lakh tonnes of raw cashewnuts per annum. In order to meet the requirement of the processing industry, India imports annually about 6-7 lakh tonnes of raw cashewnuts from African and other countries. The requirement of raw cashewnuts shall be at least 25 lakh tonnes by 2030. Increasing productivity and expansion of area under cashew are the main strategies for enhancing the production of raw cashewnuts in the country. The Government of India has contemplated various developmental measures to attain self sufficiency in the production of raw cashewnuts in India. Increasing productivity is the mandate of research organizations. The Directorate of Cashewnut and Cocoa Development (DCCD), Ministry of Agriculture has been implementing the developmental measures in various cashew growing states under National Horticulture

Mission (NHM) and in the North-Eastern States under Technology Mission for NEH Region. Development of new plantation and replanting of old senile and uneconomical cashew gardens with high yielding varieties are the major activities of the cashew growing states for increasing production of cashew.

The cashew industry witnessed a 70 per cent increase in international prices from that of previous year. Since India has also become one of the major cashew consumers, the importance of cashew is bound to grow in the next 10 years. Cashew farmers are happy with good prices for raw cashewnuts, but processors are apprehensive of soaring prices of raw cashewnuts as well as decline in quantities of imported raw cashewnuts. Ivory Coast is the major supplier of quality raw cashewnuts to India and produces nearly 4 lakh tonnes of raw cashewnuts annually. Delay and uncertainty in the supply of raw cashewnuts from Ivory Coast due to political strife is causing major concern for the cashew trade. India and Vietnam account for more than 50 per cent of the global cashew production.

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In spite of the export market being very challenging for Indian cashew kernels, the product continues to be strong in the markets of the USA. Though there is stiff competition from Brazil and Vietnam, the market position enjoyed by Indian cashew has been by and large safe and 45 per cent of cashew kernel purchased in this year by the Kraft Foods which is the biggest importer of cashew kernels in the USA is from India. Indian cashew kernel is ranked as the best in international market and hence importers of cashew kernels look forward to India. Indian and Asian markets have, of late, become major consumers of cashew kernels while consumption in traditional markets remained largely flat, making Asia a deciding factor of prices.

It may be interesting to persons connected with cashew to note that NEC Corporation, Japan has developed a new form of bio-plastic that could be used for mobile phones and 70 per cent of it is made from a mixture of cellulose, a main component of plant stems, with cardanol, a primary component of cashewnut shells.



**[M.G. BHAT]**  
**Director**

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## **FOCUS ON RESEARCH**

### **Development, Identification and Validation of Markers in Cashew Thimmappaiah and Shobha, D. Directorate of Cashew Research (DCR), Puttur**

Markers play an important role in crop improvement. They have applications in management of crop genetic resources by estimating the diversity, identification of duplicates and core group of germplasm. Apart from these, the markers are correlated and linked with economic characters and they can be used for mapping as well. Marker association requires genotyping which involves evaluation of a large segregating population. Of the several strategies employed for genotyping, bulk segregant analysis (BSA) technique of Michelmore *et al.* (1991) was found to be efficient utilizing only a limited

representative number of plants in the population. Here the segregating population is grouped according to phenotypic expression of a trait and tested for difference in allele frequency between the populations of bulk. Markers identified after validation will be useful in marker assisted selection (MAS). MAS is of great help in perennial crop like cashew as they may be applied in seedling stage long before the tree is matured. Markers have been tagged to different economic characters using this technique. DNA markers have been linked to fruit colour of pear, apple and grapes. They have been

found associated with resistance to scab and growth habit in apple, identification of sex in pistachio, early flowering in eucalyptus and seedlessness in grapes. Similarly, an attempt was made for the first time by using bulk segregant analysis in cashew under a DBT programme to associate markers with economic characters. The results are presented below.

### Phenotypic evaluation

Segregating progeny ( $F_2$ ) of a cross (VRI-2 x VTH-711/4) consisting of 251 individual plants and 177 accessions of cashew germplasm were evaluated for different phenotypic characters. The

characters included various morpho-physiological, fruiting, yield and nut characters. The evaluation revealed wide variability for different characters. Out of many characters recorded only 15-20 important economic characters were considered for the analysis.

### Constitution of bulks

Plants with extreme expression of 10 numbers were selected and their DNA was pooled to constitute bulks. In  $F_2$  progeny 11 (character) pairs of DNA bulks and in germplasm 6 pairs of bulks (Table 1) were constituted for most important characters.

**Table 1. Details of DNA bulks in germplasm constituted for screening with different markers**

Character	Phenotype value	Range	Accession number (NRC)
Plant height (m)	Low (< 2.8)	1.5 – 2.8	327, 343, 351, 325, 339, 30, 358, 43, 24, 352.
	High (> 7.3 )	7.3 – 8.17	153, 131, 100, 120, 121, 316, 317, 122, 231, 251.
Weight of apple (g)	Low (< 36.7)	10.0 – 36.7	153, 152, 238, 3, 81, 266, 217, 121, 259, 236.
	High (> 104.9)	104.9 – 142.0	112, 111, 362, 269, 298, 327, 59, 145, 164, 140.
Flowering duration (days)	Low (< 54)	42 – 54	266, 246, 238, 265, 221, 229, 262, 217, 244, 274.
	High (> 115)	115 – 150	329, 348, 66, 67, 60, 140, 3, 12, 24, 84.
Nut weight (g)	Low (< 4.3)	2.0 – 4.3	152, 153, 41, 81, 22, 168, 46, 227, 318, 319.
	High (> 12.0)	12.0 – 16.8	107, 278, 194, 279, 112, 111, 161, 183, 269, 322.
Shelling percentage (%)	Low (< 20)	5.3 – 20.0	115, 116, 107, 217, 335, 177, 153, 161, 173, 43.
	High (> 35.5)	35.5 – 41.0	319, 81, 318, 330, 324, 342, 322, 325, 327, 343.
Cumulative yield / tree (kg)	Low (< 3.85)	0.40 – 3.85	153, 152, 121, 116, 286, 285, 188, 170, 269, 259.
	High (> 12.5)	12.5 – 16.91	36, 133, 235, 47, 232, 68, 219, 56, 3, 229.

## Bulk segregant analysis

Several DNA markers namely RAPD, ISSR and SSR markers were used to screen the bulks. By preliminary analysis primers / markers which are polymorphic to parental DNA were identified. These identified markers were used to screen F<sub>2</sub> bulks and germplasm bulks. Several markers which are polymorphic between the bulks of F<sub>2</sub> were identified, but could not be validated within their individuals. However, screening of germplasm bulks with various markers could identify markers only in RAPD which are polymorphic not only between the bulks but also with the individuals of bulks.

## Marker identification

Screening of germplasm bulks could identify four RAPD markers which are polymorphic between the bulks for nut weight and plant stature. Out of the three markers (OPN14<sub>775</sub>, UBC185<sub>275</sub> and UBC184<sub>475</sub>) identified for nut weight, two markers (OPN14<sub>775</sub> and UBC185<sub>275</sub>) were associated with low nut weight and one

marker (UBC184<sub>475</sub>) was associated with high nut weight. The fourth marker (UBC185<sub>275</sub>) detected was associated with low plant height (dwarfing). The distributions of markers in the individuals of bulks are shown in Table 2. Another marker of RAPD was identified which was polymorphic between the bulks as well as individuals of bulk of cumulative yield. This marker showed association with high cumulative yield.

## Validation

The RAPD markers identified for nut weight and plant stature were validated with 177 individual plants of F<sub>2</sub> progeny (VRI-2 x VTH-711/4) and 127 accessions of germplasm. The markers showed variable segregation in these populations. There were some inconsistencies in the banding pattern which was attributed to insufficient population, segregation and high heterozygosity. The markers identified will become reproducible if they are converted into ‘SCAR’ markers. Further these markers can be used in marker assisted selection programme in breeding.

**Table 2. Segregation of RAPD markers identified in the individuals of two contrasting bulks**

Character	RAPD band / marker	High phenotype		Low phenotype	
		Present (%)	Absent (%)	Present (%)	Absent (%)
Nut weight	UBC 184 <sub>475</sub>	75	25	10	90
	UBC 185 <sub>275</sub>	0	100	50	50
	OPN 14 <sub>775</sub>	25	75	77.8	22.2
Plant height	UBC 185 <sub>275</sub>	0	100	66.7	33.3

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## AICRP - Cashew Co-operating Centre

### ICAR Research Complex for NEH Region, Umiam, Barapani, Meghalaya

The Indian Council of Agricultural Research (ICAR) has sanctioned a new Co-operating Centre - Barapani in Meghalaya under All India Co-ordinated Research Project on Cashew (AICRP-Cashew) in the XI Plan EFC. The trials of Co-operating Centre of AICRP-Cashew, Barapani are located at Farm of Krishi Vigyan Kendra (KVK), Tura, West Garo Hills, Meghalaya. The KVK, West Garo Hills was sanctioned by ICAR in the year 1979 and started functioning from May, 1980 under the Zonal Project Directorate, Zone-III, ICAR, Umiam and administrative control of ICAR Research Complex for NEH Region, Umiam, Meghalaya. Since inception, this KVK has been working for the improvement of livelihood of farming community in the district through scientific intervention in agriculture and allied sector.

Meghalaya is one of the eight sister states in the North East of India, covering an area of 22,489 km<sup>2</sup>. It is situated between 25°1' and 26°5' N latitude and between 85°49' and 92°52' E longitude. The temperature ranges from 2 to 36°C depending upon the altitude ranging between 300 m above MSL to 2000 m above MSL. Meghalaya is amongst the highest rainfall areas in the world, predominantly mountainous, lying between the Brahmaputra valley in the North and the Surma valley (Bangladesh) in the South.

West Garo Hills is one of the seven districts (East Garo Hills, East Khasi Hills, Jaintia Hills, Ri-Bhoi, South Garo Hills, West Garo

Hills and the West Khasi Hills) of Meghalaya state. West Garo Hills came under Meghalaya state in 1972, following the formation of Meghalaya from the Khasi, Jaintia and Garo districts of Assam. The district headquarters of West Garo Hills is Tura, which is the second largest town in the state after Shillong. The West Garo Hills district lies on the western part of the state of Meghalaya bounded by the East Garo Hills district on the east, the South Garo Hills on the south-east, the Goalpara district of Assam on the north and north-west and Bangladesh on the south. West Garo Hills district is situated between 89° 40' and 90° 30' E longitude and between 25° 20' and 26° N latitude with an altitude of 600 to 1000 m above MSL. The West Garo Hills district is mostly hilly with plains fringing the northern, western and the south-western borders. Agriculture is the main source of income. Jhum cultivation is practiced on a large scale. The average annual rainfall of West Garo Hills district is about 3370 mm. The temperature varies from 11 to 30°C. KVK, Tura farm is located at an elevation of 276 m above MSL. The headquarters of the ICAR Research Complex for NEH region which is located at Barapani (Umiam Lake) is about 25 km away from Shillong towards Guwahati. Tura station is located at a distance of 300 km from the headquarters of the ICAR Research Complex for NEH region via Guwahati.

The terrain in West Garo Hills has played an important role in determining the

characteristics of the soils. Two types of soils are generally recognized in the Garo Hills, viz., the soil on the hills and the soil of the plain lands. The hill soil is finely textured heavy loam. Clayey loam is also found in some places. The colour of the soil is generally red where the soil is derived from sandstone or gneiss. Plain land soils are sandy or sandy loam or clay loam in texture and rich in organic matter. The reaction of the soils varies from strongly acidic (pH 4.5 to 5.0) to acidic (pH 5.0 to 6.0).

Cashew was introduced in 1954-55 (through seeds) at Ma-changpani, Amphanggiri (Bagmara-Dist.) and Wa'ge asi pilot projects by the Soil Conservation Department, Assam on trial basis. The efforts of Soil and Water Conservation Department resulted in covering 1459 ha under cashew plantations in west Garo Hills alone. Even though, cashew was introduced to Meghalaya for the purpose of soil and water conservation, the crop has adapted well in West Garo Hills. In the year 2003-04, introduction of cashew grafts was made in this region in a small scale. The Garo Hills lies in a heavy rainfall area, and the practice of jhum cultivation has led to large scale erosion in many areas. Several cashew trees of this area had exposed roots due to severe soil erosion losses. In Garo Hills rains start in the early April and continues till first week of October with high speed of

winds, hailstorm and cyclone resulting in cashew crop damage. Cashew farmers also find it difficult to dry the nuts after the harvest. The farmers generally pick up the fallen nuts and sell to the local cashew traders at a price much lower than the main cashew growing tract of the country.

The cashewnuts produced in NEH region are mostly processed locally or in cashewnut processing factories at Mankachar in Dhubri Dist. of Assam State. About 15-20 cashewnut processing factories are available in Mankachar. Cashew processing is being done by drum roasting. However, under NHM scheme, some on-farm processing units have been purchased from Maharashtra and on-farm level processing units are becoming popular in this region.

In order to visualize the cashew growing scenario in West Garo Hills, Meghalaya, year-wise area, production and productivity of cashew in the last four years (2006-10) is furnished in Table 1. In West Garo Hills, the area and production during last four years is increasing steadily. Cashew occupies an area of around 8358 ha with production 14352 metric tonnes in the three districts of East, West and South Garo Hills of Meghalaya.

Since there is great demand for Indian organic cashew kernels, NEH region can be developed as an important region for growing

**Table 1. Area, production and productivity trends of cashew in West Garo Hills (Meghalaya), 2006-10**

	2006-07	2007-08	2008-09	2009-10
Area (ha)	3211.6	3404.1	3984	4384
Production (metric tonnes)	7770	8157	9493	10468
Productivity (t/ha)	2.42	2.40	2.38	2.39

Source: DHO, West Garo Hills, Meghalaya.

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cashew organically. As soils of this region are rich in humus and organic matter content, there is no need of addition of nutrients from external source.

### Research activities

Experiments allotted under AICRP on Cashew are as follows:

- i) Germplasm collection, conservation, evaluation, characterization and cataloguing.
- ii) Varietal evaluation trial - Multilocation trial V: Performance of released varieties.
- iii) Varietal evaluation trial - Multilocation trial VI: Special MLT for new centres.
- iv) Organic management of cashew.
- v) Spacing cum fertilizer trial in cashew.

Experiments already taken up are:

- i) Germplasm collection, conservation, evaluation, characterization and cataloguing: The cashew germplasm consisting of

35 accessions were evaluated in which 10 accessions have been identified for superior yield and growth characters.

ii) Varietal evaluation trial - Multilocation trial VI: Special MLT for new centres: Eight released varieties [Dhana, V-4, NRCC Selection-2, BPP-8, H-303, VRI-3, VRI(CW)H-1 and Bhaskara] have been planted in 2010.

### Extension activities

Training programmes on 'Softwood grafting' (2 days duration), 'Nursery management in cashew' (1 day), 'Rejuvenation of old cashew plantations' (3 days) and 'Management of tea mosquito bug and cashew stem and root borer' (2 days) were conducted to farmers of West Garo Hills, Meghalaya.

### Address for communication

Director  
ICAR Research Complex for NEH Region  
Umiam, Barapani, Meghalaya - 793 103.

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## NEWS FROM DEVELOPMENT FRONT

### ANNUAL CASHEW DAY

Cashew day was organized on 1 March 2011 in which more than 250 farmers participated. Farmers were given exposure visits to experimental plots of DCR, cashew museum and also to a farmer's plot to show the performance of different cashew varieties and the results of various cashew production technologies. A group discussion was organized on the occasion in which the farmers and experts were given opportunity to talk on cashew related activities. There was a discussion on formation of cashew growers association led by the Chairman of Karnataka State Souharda Federal Co-operative Ltd.



There was a question and answer hour in which farmers were given information sought on cashew and cashew related problems.

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## INNOVATIVE CASHEW FARMERS MEET - 2011

Directorate of Cashew Research, Puttur, organized “Innovative Cashew Farmers Meet” on 18 June 2011. Dr. Vijay B. Mehta, Vice Chancellor, Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth (BSSKVV), Dapoli was the Chief Guest for the event. The meet was conducted on the occasion of Silver Jubilee Foundation Day of DCR, Puttur to identify farm innovations from the farmers and felicitate them. Dr. M.G. Bhat, Director, DCR, in his address while thanking the innovative cashew farmers and other cashew farmers for participation in the meet, stressed that more farmers can innovate and can solve their day to day problems related to cashew cultivation and help in increasing productivity. The Chief Guest appreciated the efforts of innovative farmers and cashew scientists for the development of cashew sector. He urged for focused research on post harvest technology, agricultural machinery, cashew marketing and economics, cropping systems, plant protection and crop improvement aspects.

Around 75 farmers including innovative and progressive farmers participated in the meet. Mr. Vasavan, innovative cashew farmer from Kerala explained his innovative method of



managing tea mosquito bug (TMB) infestation in cashew using red ants. Mr. Jayaram Kedaliya expressed his innovations in nursery management using silpaulin sheets and intercropping cashew with cocoa and pepper.

The meet also discussed innovative approaches developed by Mr. (Late) Kumbadi Venkataramana Bhat for collecting fallen cashew apple with nut and the cashew variety ‘Goa-1’ developed by Mr. Prabhakar Keni, innovative farmer from Goa. A farmer-scientist interaction followed where various aspects of cashew farming was discussed in detail with exchange of innovative ideas from farmers. The innovative farmers were felicitated for their contribution on this occasion.

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## MEETINGS

### राजभाषा हिन्दी कार्यक्रम

काजू अनुसंधान निदेशालय में इस छःमाही में नगर राजभाषा कार्यान्वयन समिति की एक बैठक और निदेशालय के हिन्दी समिति की दो बैठकों को आयोजन किया गया ।

समिति की तिमाही बैठक में कार्यालय में हो रही हिन्दी कार्यों की समीक्षा किया गया । केन्द्र से आए वार्षिक

कार्यक्रम सूची के अनुसार लक्ष्य प्राप्ती के लिए जरूरी कार्रवाई करने संबंध में भी चर्चा किया गया । हिन्दी कार्यान्वयन को बढ़ावा देने के संबंध में जरूरी कदम उठाने के बारे में सभी अनुभागों को सूचना दिया गया ।

जनवरी महिने में पुत्तूर नगर राजभाषा कार्यान्वयन समिति (नराकास) की 19 वीं अर्धवार्षिक बैठक का आयोजन





किया गया था। बैठक में पुत्तूर के आसपास के सभी केन्द्र सरकारी कार्यालयों के प्रमुखों ने भाग लिया। दैनंदिन कामकाज में सदस्यों का शंका दूर करने के लिए उन्हें जरूरी प्रशिक्षण दिया गया।

हमारा वार्षिक प्रकाशन 'पुत्तूर नराकास वार्ता' का विमोचन नराकास के अर्धवार्षिक बैठक के अवसर पर किया गया।

### **Institute Management Committee (IMC)**

**Meeting:** The 34<sup>th</sup> meeting of the IMC was held on 25 March 2011 under the Chairmanship of Dr. M.G. Bhat, Director, DCR, Puttur. In the meeting, the progress made in the different ongoing research projects and other aspects related to the management of this Directorate were discussed. The list of equipments purchased during 2010-11 were discussed. Dr. M. Hanumanthappa, Associate Director of Research, ZARS, Brahmavar, Udupi; Dr. K.S. Ananda, Principal Scientist, CPCRI (RS), Vittal; Shri. P. Balabrahmaiah, Senior Finance and Accounts Officer, CPCRI, Kasargod; Dr. P.M. Haldankar (Non-Official Member), Professor and Head, Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli; Shri. N. Narayana Bhat (Non-Official Member), Noojibailu, Buntwal, Karnataka; Dr. P.S. Bhat and Dr. T.R. Rupa, Principal Scientists and Shri. K.M. Lingaraja, AAO

from DCR, Puttur attended the meeting.

### **Research Advisory Committee (RAC)**

**Meeting:** The third meeting of the fifth RAC (15<sup>th</sup> meeting) of the Directorate was held during 9-10 May 2011 under the Chairmanship of Dr. D.P. Ray, Vice Chancellor, OUAT, Bhubaneswar. Dr. M.G. Bhat, Director, DCR briefed the members of RAC about the present scenario of cashew production and the research activities that are going on in cashew at the Directorate. Later the chairman and members of V RAC made their opening remarks about the research activities that are being carried out at the Directorate. Chairman, Dr. D.P. Ray opined that research work should cater to the needs of the farmer. He said that major contribution to GDP comes from Horticulture, Animal Sciences and Fisheries. He cautioned that recommendations given by the researcher should be useful to the farming community. Dr. P.M. Salimath, Director of Research, UAS, Dharwad; Dr. P.M. Haldankar, Professor and Head, Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli; Dr. M.N. Khare, Ex-Dean, JNKVV, Jabalpur and Sri. N. Narayana Bhat (Non-Official Member), Karnataka participated in the meeting and the progress made under the research projects was discussed and recommendations were made.

### **Institute Research Committee (IRC)**

**Meeting:** The 24<sup>th</sup> meeting of IRC was held during 28-29 June 2011. Dr. M.G. Bhat, Director, DCR and Chairman of the IRC meeting briefed about the progress made in different research projects. There were

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technical sessions on “Crop Improvement”, “Crop Management” [chaired by Dr. N.G. Raghu Mohan, Former Principal Scientist (Soil Science) & Former Head, Regional Centre of NBSS&LUP, Bangalore], “Crop Protection” [chaired by Dr. M. Nagesh, Principal Scientist (Agricultural Entomology),

NBAIL, Bangalore], “Post Harvest Technology” and “Transfer of Technology and Computer Application”. The scientists of the Directorate presented progress made under various projects and technical programme of all the projects was finalized.

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## TRANSFER OF TECHNOLOGY EFFORTS

### Training Programme

A training programme on ‘Cashew Production Technology’ was organized during 19-21 January 2011 for 14 participants from DHRUVA unit in Gujarat with the support of BAIF, Pune and Plantation Corporation of Kerala (PCK), Kerala. The latest developments in cashew production technology were explained to the trainees during the training programme. The trainees were taken to various experimental plots,



demonstration plots, cashew nurseries and processing factories.

### Consultancy / Advisory visits

A team of scientists participated in the Workshop cum Seminar on Cashew organized at College of Agriculture, Indira Gandhi Krishi Vishwa Vidyalaya, Jagdalpur,

Chattisgarh and delivered lectures on various aspects of cashew cultivation (4-5 January 2011).

Scientists participated in a training programme on Technology Dissemination at KVK, Mangalore and delivered lectures on Production and Processing aspects of Cashew (4 February 2011).

Scientists participated in Cashew day programme of ARS, Ullal (12 February 2011) and delivered lectures on Cashew Production Technology.

A scientist participated in State Level Workshop on Cashew organized by ARS, Vridhachalam, Tamil Nadu and delivered a talk on Training and Pruning in Cashew (24 February 2011).

Scientist of this Directorate served as a member of the team for evaluation and inspection of cashew nurseries and cashew frontline technology programmes in various parts of the country. The team visited various newly planted orchards of KCDC, Karnataka; GFDC, Goa and plantations raised by farmers under Cashew Expansion Programme of National Horticulture Mission in Karnataka for inspection and evaluation.

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## Radio Talks / TV Programmes

During the year, interviews were recorded on varieties of cashew and pests of cashew, and broadcast by AIR, Mangalore.

A TV interview was recorded on varieties of cashew at ARS, Jagdalpur in Hindi and was telecast on 8 January 2011.

A series of recordings on various aspects of cashew cultivation was done during the month of March 2011 by Doordarshan-1, Chandana (Kannada) TV channel (Telecast from the month of April 2011 onwards).

## Visitors

Several individual visitors and visitors in batches including farmers, students and officials to the institute were taken to various experimental plots, cashew nurseries, cashew



museum and laboratories and were explained about cashew cultivation practices and research findings of this Directorate.

## Participation in exhibitions

10-12 February 2011 - Exhibition organized

at NBFGR, Lucknow by Agricultural Science Congress, New Delhi in connection with AGRIVISION.

5-6 March 2011 - CPRI (RS), Modipuram in connection with Udyan Mela.

## Demonstrations

The demonstration plots established in farmers' fields at Puttur, Sullia and Bantwal taluks of Dakshina Kannada district of Karnataka with the financial support of NHM programme of DCCD, Kochi were monitored regularly by the Scientists of this Directorate and technical advice was given as and when required.

## Supply of Planting Material

About 75,000 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.

## Technical Publications

Technical Bulletin - Rejuvenation of cashew trees (Gerumaragala Punashchetana) (Kannada).

Technical Bulletin - Improved cashew cultivation (Sudhaarita Geru Besaaya) (Kannada).

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Technical Bulletin - High density planting system and cultivation in cashew (Geru beleyalli ghana saandra besaaya) (Kannada).

Technical Bulletin - Cashew cultivation practices (Revised) (English).

Technical Bulletin - Cashew Stem and Root Borer - A major pest of cashew (Telugu).

Technical Bulletin - Cashew Stem and Root Borer - A major pest of cashew (Konkani).

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## STAFF NEWS

### Appointment

Dr. Sajeev, M.V.- Joined as Scientist, Agricultural Extension on 7 April 2011 on transfer from Barapani, Meghalaya.

### Promotion

Ms. M. Leela, UDC - Promoted as Assistant w.e.f. 24 March 2011.

### Transfer

Sri. H. Ganesha, Assistant Finance & Accounts Officer - Relieved of his duties on 25 March 2011 to join as Finance & Accounts Officer at DOR, Hyderabad.

Dr. P.D. Sreekanth, Scientist (SS) (Computer Application) - Relieved of his duties on 10 May 2011 on his transfer to NAARM, Hyderabad.

Sri. Jayarama Naik, K.M., Assistant

Administrative Officer - Relieved of his duties on 8 June 2011 to join as Administrative Officer at CPCRI, Kasargod.

### Retirement

Sri. P.S. Shekhara, Skilled Support Staff - Retired from the ICAR service on superannuation on 31 January 2011.

### ICAR Inter-Institutional sports meet (South Zone)

The following staff members participated and won the prizes in ICAR Inter-Institutional sports meet (South Zone) held at IIHR, Bangalore during 7-11 February 2011.

Sri. R. Muthuraj – I place (400 m Race).

Sri. B. Kushalappa Gowda – II place (800 and 1500 m Race).

Sri. P. Abdulla – II place (Chess).

*Published by: Dr. M.G. Bhat, Director, Directorate of Cashew Research  
Puttur-574 202, D.K., Karnataka*

*Compiled and Edited by Dr. T.R. Rupa and Dr. J.D. Adiga*

*Word Processed by Dr. T.R. Rupa and Dr. J.D. Adiga*

Ph: (08251) 230902; Fax (08251) 234350

E-mail: dircajures@yahoo.com, dircajures@gmail.com, dircajures@rediffmail.com

Website : <http://www.cashew.res.in>