काजू समाचार
CASHEW NEWS

भा. कृ . आनु. प. काजू अनुसंधान निदेशालय, पुत्तूर के अर्धवार्षिक वार्तापत्र

HALF YEARLY NEWSLETTER OF ICAR- DIRECTORATE OF CASHEW RESEARCH, PUTTUR

VOLUME 29
No. 1

Director's Desk

Cashew is a crop of high economic value and has a considerable foreign exchange for the country through export of cashew kernels and Cashew Nut Shell Liquid, a by product of cashew nut processing. Cashew represents 12th position among the agricultural commodities exported from India in terms of value accounting for 0.2% of the total export earnings and 1.4% of the total agricultural export earnings. The consumer perception of cashew has shifted from a 'luxury' commodity to that of a 'health and necessity' commodity. Traceability, strong supply chain linkages and adherence to international food safety standards are important factors of a competitive business in cashew. The cashewnut processing is a lucrative business and it has been steady since time immemorial. Besides, the cashew market is quite stable because of its easy availability and growing demand.

Another economic part is the cashew apple. Its uses except for making Feni, an alcoholic beverage is not very much commercially exploited. The attractive cashew apple which holds cashew nut is a reservoir of minerals and vitamins especially vitamin C and polysaccharides. But there are certain constraints that limits the transportation, extensive utility, and commercialization, such as (i) formation of abscission layer in pedicel and abrupt increase in apple size at the end phase of maturity (ii) the thin skin of cashew apple makes it susceptible to bruises and (iii) very short storage life. The usual practice during harvest is that the cashew nuts are detached from the fallen cashew apples and the cashew apples are left in the field.

The Indian cashew market size is expected to grow from USD 2,313.03 million in 2023 to USD 2,787.20 million by 2028, at a CAGR of 3.80% during the forecast period (2023-2028). The biggest use of cashews is snack food, but many innovative food companies are discovering the versatility and exotic value of cashews as an ingredient. The major consumers in the world include India, USA, EU, Middle east, Japan, China and Australasia. It is estimated that the demand is growing at 7.02% per annum. Though cashew can be classified as a health nut, market promotion of cashew is not much carried out projecting the health advantages of cashew.

Although, India is the largest consumer of cashew kernels in the world, consumption pattern, irrespective of its form i.e., wholes or broken in plain form, elsewhere the major consumption is in value added form. But value-added exports from India are not taking place envisaging competition with the local brands. In view of strong brand image and preference of native brands in the consuming countries, it is

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of native brands in the consuming countries, it is extremely difficult to penetrate the overseas market. Lack of advanced production technique is another reason. The Government of India and Cashew Export promotion Council of India have taken initiatives for the ease of exports and growth of the cashew industry (Presently, it is administered by Ministry of Food Processing industries, GoI). As non-financial assistance to exporters, many trade delegations, buyer-seller meets, fairs, development workshops and research development data are provided. Additionally, the basic custom duty on raw cashewnuts was reduced to 2.5% from the previous 9.34 % and the Goods and Service tax (GST) on the same was reduced to 5% from 12%. Offering cashews in flavors is yet another strategy to be adopted to enter the snack market in the country. Start-ups on value added products needs to be encouraged due to high demand for cashew kernels, expanding market for value-added products, reduced startup prices, vast array of products, capacity for high earnings margins, growing global market and also support from the cashew market. Farm level cashewnut processing is the concept through which rural youth, women self help group and cluster-based home scale processing can be promoted escalating rural economy.

Bioethanol production, from the residual cashew apple pulp, also termed as bagasse,is a promising way of utilizing cashew apple. This bagasse contains about 19–24% of cellulose, 12% of hemicellulose, and 22-38% of lignin on a dry basis. The value-added products from cashew apple are a thrust area of research for food technologists, industrialists, and farmers and of course these products are a definite alternate solution for nutritional source. Processing of cashew apple will turn out to be economic potential for farmers, entrepreneurs, and consumers. The lack of processing facility, knowledge or skills, and market are the major constraints when it comes to cashew apple utilization. The limited knowledge or skills in the use of cashew apples makes the local people turn to rely on the government for the establishment of factories and market avenues. This presents an opportunity for training institutions and private educationists to create business or training programs to provide the necessary skills needed for value addition or processing of the cashew apples into semi processed or finished products.

The global cashew production has been increasing because of the popularity of cashew-based snacks worldwide due to their taste and nutritional benefits. Moreover, with the changing lifestyle and rising awareness, the demand for plant- based diets has increased recently. The spread of cashew milk and butter has gained popularity worldwide, especially in North America and Europe. While India has a legacy of leadership in the global cashew industry, it must continuously reassess its comparative advantages in order to remain competitive. Fair trade and organic production are promising but unexplored options and should be more fully developed to benefit small producers and firms. The price of raw cashews has been steadily raising, making it feasible to offer value-added products at a premium rate. Additionally, the need for cashew products remains to grow, making it a successful sector. Value added products is offering entrepreneurs the possibility to be creative as well as develop a distinct product line that attract a wide variety of customers. All these factors are anticipated to boost the market growth in the coming years.

(Director)

1. Research Highlights

NRC-301: A unique cashew germplasm with big cashew apple and slanting nuts

NRC-301 a unique cashew germplasm accession with bold nut and big cashew apples, bearing nut in slant position compare to common vertical / straight bearing accessions. The special features of this new accessions are, dual type with desirable nut and apple quality traits. Nuts are bold with average weight of 11.94g with very high shelling percentage (31.61%). Kernel weight 3.74g of W 130 grade with easy peeling testa. Large size cashew apple (183.10g) with less astringency (tannin 5.84 mg/100g).

(Eradasappa, E., Saroj, P.L. Meena, R.K. , Preethi, P.,Vanitha, K, Veena, G.L. , Janani P., Nayak, M.G.Loganathan, M., Rajkumar A.D., Siddanna Savadi, Mohana, G.S., J. Dinakara Adiga, Shamsudheen, M. D. Balasubramanian and Raviprasad T.N. ICAR-Directorate of Cashew Research, Puttur-574202, Karnataka

Discovery of genome-wide genetic variations and development of first set of 88 InDel markers for genetics research in cashew

The genome-wide variants (GVs) were discovered and characterized viz., 420,560 SNPs and 26,987 InDels by resequencing the genome of cashew cv. Nethra Vaman and aligning with the reported draft genome of cashew cv. Bhaskara. The average density of SNPs was 2,867.78 per Mb of the genome while the average density of InDels was 184.02 per Mb. KEGG pathway analysis of the genes with GVs revealed that the primary metabolic pathways, plant hormone signal transduction and Mitogen-activated protein kinase (MAPK) pathways were enriched. Besides, the first set of 88 InDel markers having the advantages of both SSR and SNP markers was developed, and 87.5% of them were highly polymorphic (PIC ≥0.50). PCR amplifications of InDel markers across different species showed 84.68%, 79.84%, 74.19%, and 58.06% successful amplification in Anacardium othonianum, *A. microcarpum, A. pumilum* and *Semecarpus anacardium,* respectively. Genetic diversity analysis using fourteen InDel markers by UPGMA method grouped the 64 cashew accessions into three main clusters. Further, InDel markers were tested for hybridity ascertaining in interspecific hybrids of *A. occidentale* and *A. microcarpum* and the hybrid purity index of markers ranged between 45% (AoINDL-40) to 94% (AoINDL-77). Thus, the genomic resources, identification and annotation of GVs, and the new class of markers developed in this study are a treasure for molecular biology, genetics, and molecular breeding in cashew and related Anacardium species.

(Siddanna Savadi, J.D. Adiga, B.M. Muralidhara, Pramod Prasad, K. Manjunatha, K. Ashwitha, Gokul Mohan, Manju Manuel, K. Manoj, ICAR-DCR Puttur and ICAR-CHES Chettalli)

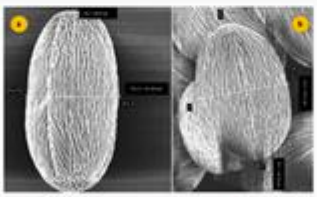
Morphological and Biochemical Characterization of a Rare CNSL Free Cashew Mutant:

Cashew nutshell (CNS) contains a corrosive brown viscous liquid referred to as cashew nutshell liquid (CNSL). CNSL free mutants are rarely observed and their morpho-biochemical characterization is limited. We carried out the morphological and biochemical analysis of CNSL free mutant NRC-116 and compared it with reference variety viz., Bhaskara. Morphologically, NRC-116 varied from Bhaskara in leaf shape and dimensions, and reproductive characteristics like sex ratio and yield-related traits. The thickness of nutshell in NRC-116 was substantially low compared to Bhaskara and has high shelling percentage. Biochemical analysis showed that NRC-116 is free of CNSL and it substantially varied from Bhaskara in terms of kernel FAs, proteins, oils and phenolics. Thus, the CNSL free nature of NRC-116 presents it as a unique genetic material for elucidating the CNSL biosynthetic pathway.

(B. M. Muralidhara, Siddanna Savadi, J. D. Adiga, K. Manjunatha, A. N. Lokesha, G. L. Veena, V. Thondaiman& G. N. Manjesh, ICAR-DCR Puttur and ICAR-CHES Chettalli)

Effect of temperature on *in vitro* pollen germination of cashew (Anacardium occidentale L.)

Flowering phenology mainly pollination is highly sensitive to temperature extremes. Thus, pollen tests can be used as a tool to screen temperature tolerant crops. The pollens of five cashew varieties comprising three early (VRI-3, Vengurla-4 and Ullal-3), one mid (Bhaskara) and one late (Madakkathara-2) were screened in field (in vivo) as well as at controlled temperatures from 5 to 50°C. The morphological features of pollen grains were also studied using Scanning Electron Microscopy (SEM). Significant differences in polar axis (P), equatorial axis (E) and P/E ratio were observed among five cashew varieties. Early varieties had high polar axis(P) and equatorial axis (E). Pollen germination under in vivo was high for early types with optimum temperature (Topt) of 25°C while it was low in mid and late types with Toptof 30°C. The pollen germination at 25°C was 75% in early types while it was 57.8 and 50.5% for mid and late types respectively at 30°C. However, mid and late varieties exhibited better tolerance to high temperature beyond 40°C suggesting their wider adaptability to high temperature. Overall, the varietal differences in pollen behaviour can be used to select cashew varieties for evaluating their adaptability to temperature extremes during flowering across various regions.



(Babli Mog, G.L. Veena, J.D. Adiga, K.B. Hebbar, Shamsudheen M, G.N. Manjesh, E. Eradasappa, G.S. Mohana, V. Thondaiman, K. Vanitha, Bhagya H.P, Manjunatha K and Anil Kumar Yadav; ICAR-DCR Puttur, Central Inland Fisheries in Research Institution, Guwahati

Development and evaluation of jaw type cashew fruit picker with container unit

In cashew orchards, conventional fruit collection is done by 'handpicking' methods for collecting the cashew fruits that are scattered on the ground from the individual fruit trees. This is not only a time-consuming but also tedious, backbreaking, and knee-painful task. It is well known that the collection of fallen fruits on a large scale is still inefficient and not cost-effective. To solve this challenging task, a hand-held jaw-type cashew fruit picker with a container unit has been developed and evaluated to increase efficiency and reduce harvesting costs. The developed prototype consisted of a main handle, a guiding handle, side covers, spring mechanisms and a container unit. The developed tool's average collecting capacity was determined to be 38.81 kg h^{-1}, depending on the density of fruits and the percentage of debris was found to be < 2.5%. The picking efficiency of the tool ranged from 91 to 95%. The developed tool is light in weight (0.8 kg) and gender-friendly.

(Manjunatha, K., D. Balasubramanian, J. D. Adiga and Ravindra Naik ICAR-DCR Puttur and ICAR-CIAE Bhopal)

Influence of foliar nutrient sprays on tea mosquito bug infestation in cashew

Tea mosquito bug (TMB) is a serious pest of cashew, can cause up to 100 % yield loss, if timely management measures are not taken up and no resistant cashew genotype is presently available in India. Three rounds of foliar nutrient sprays were done at monthly intervals starting from flushing on the trees of Ullal-4, Dhana and Bhaskara varieties. After three rounds of sprays, none of the nutrient treatments tested were effective in reducing TMB damage. Overall, TMB damage grade varied from 0.39 to 2.5 in the treated trees (out of 0-4 score). The pooled mean TMB damage grade was less only in insecticide treated trees (0.40 and 0.43), but high in all the nutrient treatments. Under pot culture trials during 2023, six nutrient treatments at higher doses viz., potassium silicate liquid and powder formulation (0:0:32.4:52.8) @ 3 and 6 ml/L and @ 3 and 6 g/L, respectively, potassium sulphate @ 2 % and mono potassium phosphate @ 2 % were imposed as foliar sprays on 4 months-old cashew seedlings. After three rounds of nutrient sprays, fourth instar TMB nymphs were allowed @ 2 /plant for 48 hours of feeding. All the treatments exhibited TMB damage grade above 3.5. Thus, foliar nutrient sprays could not reduce TMB infestation under high population pressure.

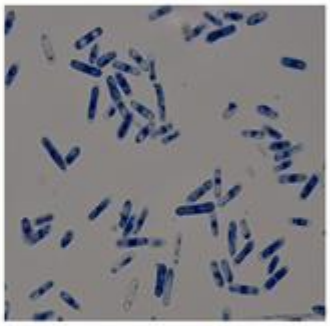
(K. Vanitha, T.N. Raviprasad, Shamshudeen, M., Veena, G.L and V. Thondaiman, ICAR-DCR Puttur)

Report of anthracnose disease in cashew apple

The disease infected cashew apple samples suspected for anthracnose were collected from Alankar and Sowthadka plantations of Karnataka Cashew Development Corporation (KCDC) and experimental cashew plots of ICAR-Directorate of Cashew Research. The initial symptoms can be observed on ripened cashew apples as irregular small dark brown to black spots. Later, the affected cashew apple develops sunken or depressed, prominent dark brown to black decay spots. The spots initially appear superficial but can coalesce and eventually penetrate deep into the fruit, resulting in fruit rotting. The mycelial growth on potato dextrose agar (PDA) medium showed aerial, whitish to greyish coloured fluffy mycelium on upper side andgreyish to yellow colour on the reverse side. The conidia are single celled, hyaline, cylindrical shaped and conidial size ranges from 12.78 ± 1.54µm × 4.75 ± 0.75µm. Based on the symptoms observed and the morphological characteristics, association of Colletotrichum spp. causing anthracnose disease of cashew apple is

confirmed.

(A)-Typical symptoms of cashew leaf blight disease, (B)- Pathogen growth on PDA media.



(H. Rajashekara[1]., R. T. P. Pandian[2]., T N Raviprasad[1]., S. Siddanna[1] and K. Vanitha[1]
[1] ICAR-Directorate of Cashew Research, Puttur-574202, Karnataka
[2] ICAR-Central Plantation Crop Research Institute, Regional Station, Vittal-574243, Karnataka)

Cashew apple slicer for value added products

A mechanized slicer for cashew apples is developed for size reduction for further processing either to vacuum fry to prepare crispy nutritive chips or drying shredded pieces to convert in to amorphous form as basic ingredient in value addition as food, feed, or fuel. It consists of feeding, singulation, slicing and discharge mechanism. Performance of the slicer evaluated and its operational capacity found to be in the range of 78 to 90 Kg h^{-1} with average round slice recovery of 68 %. Floor space required is 2.38 M2 and total power requirement is around 1.54 HP.

(D Balasubramanian and Ravindra Naik, ICAR-DCR, Puttur, ICAR-CIAE, Tamil Nadu)

Protocol for the preparation of cashew apple powder

Freshly harvested fully ripened cashew apples (CA) are washed in running water to remove adhering dirt or other unwanted matter. Cashew apples are sliced with 2-3 mm thick with circular c/s, manually or mechanically and treated it with aqueous solution with specific concentration for a short period. Later the treated CA slices need to be immersed in preservative solution for about 2-3 min. to inactive natural microorganism. Drain excess water adhering to surface of CA slices by transferring to wire mesh tray. Drained CA slices are spread in a thin layer on the wire mesh tray, loaded on to the mobile trolley and shifted to convection dryer maintained at pre-determined air temperature. Change the position of the tray after every 2 h and turn partially dried CA slices after 4-5 h to ensure uniform drying. End point of moisture diffusion process is that CA slices become crispy and appear shrivelled on its surface. Grind dried CA slices for size reduction and again dry for short period to facilitate further grinding. Pulverise the dried CA slices and sieve to obtain cashew apple powder of uniform particle size.

(D Balasubramanian, ICAR-DCR and Ravindra Naik, ICAR-CIAE, Tamil Nadu)

Development of extrudate from cashew apple powder blended corn-rice mixture

Cashew apple, a major by-product of cashew plantations and processing units has the commercial potential to be exploited as a vital source of intrinsic nutritive components. The present study focused on the utilization of the cashew apple powder as a biofortifying agent during the preparation of cereal based extrudates. The effect of selective proportion of rice flour (25 – 35%) and cashew apple powder (5 – 15%) on product characteristics viz., bulk density, expansion ratio, water solubility and water absorption index, compression force and cutting strength were investigated using mixture-process design. The extrusion condition of 12% cashew apple powder, 28% rice flour, 60% corn flour and 30 Hz screw speed were determined as optimum conditions for development of cashew apple powder incorporated rice-corn based extrudates withoptimum responses of expansion ratio 2.43, bulk density 0.13 gcm^{-3}, cutting force 19.61N, and bending strength 38.14N. The incorporation of cashew apple powder as an ingredient in the cereal based extrudates had significantly increased their protein, overall mineral content, phenolic and total antioxidant activity.

(D Balasubramanian, ICAR-DCR, Puttur, R Pandiselvan, M R Manikandan, ICAR-CPCRI, Kerala)

Diagnostic investigation of CPI in Andhara Pradesh

Diagnostic investigation carried out in cashewnut processing units located in Andhra Pradesh state and certain problems associated with labour oriented or mechanized processing units identified. Processing units are mostly concentrated in Palasa and Kasibugga, Srikakulam district and a total of 3 lakh MT of raw cashewnuts processed during the last financial

yearwith 228 registered units in this region. On an average Rs 11.49 to Rs 19.22 per unit weight of RCN is incurred as processing cost irrespective of scale of processing and degree of mechanization. Inadequate supply of raw cashewnuts, non-availability of skilled work force and higher labour wages are the major problems irrespective method of processing. Although traditional method of drum roasting method is followed in the state, cost effective steaming method is dominant in majority of processing units. Discolouration of cashew kernels, increased broken kernels and oily kernels during automated shelling are the major challenges to be tackled. Fully automated unit showed lesser processing cost incurred for unit weight of the nuts, compared to other mode of processing due to bulk production and lesser manpower in the line of production.

(D Balasubramanian, Principal Scientist, ICAR-DCR, Karnataka)

Development of Cashew apple Ice cream

Cashew apple ice-cream is one of the promising ways to utilize this overlooked fruit and create new market for the product. As the fruit are rich in vitamin c and tannin content the ice cream preparation requirespreliminary treatment to avoid coagulation. The preparation methodology was standardized to obtain a nutritionally rich ice-cream with cashewappleflavour. The cashew apple ice cream was rich in Vitamin C, protein, essential minerals, phenols, flavonoids, and total antioxidants activity. Cashew apple pulp is a flavourful and unique ingredient that can be successfully used to make ice cream to add a distinctive taste and texture.

(G.L. Veena, Kalaikannan, S., J.D. Adiga,Shamsudheen M, Preethi, P.,and V. Thondaiman, ICAR-DCR Puttur)

2. Publications

Research Articles

- Savadi, S., Adiga, J. D., Muralidhara, B. M., Prasad, P., Manjunatha, K., Ashwitha, K. and Manoj, K., 2023. Discovery of genome-wide genetic variations and development of first set of InDel markers for genetics research in cashew. Scientia Horticulturae, 320: 112233.

- Muralidhara, B. M., Savadi, S., Adiga, J. D., Manjunatha, K., Lokesha, A. N., Veena, G. L. and Manjesh, G. N., 2023. A First Report on Morphological and Biochemical Characterization of a Rare CNSL Free Cashew Mutant. *National Academy Science Letters,* 1-4.

- Veena, G.L., J.D. Adiga, G.S. Mohana, E. Eradasappa, SiddannaSavadi, K. Vanitha, V. Thondaiman, and Shamsudheen M. 2023. Purple cashew (Anacardium occidentale L.): a Unique Cashew type. *National Academy Science Letters.* DOI:10.1007/s40009-023-01307

- Babli Mog, Veena G.L., Shamsudeen M., Manjesh G. N., Eradasappa E., G.S. Mohana, Thondaiman V., K. Vanitha, JamboorDinakara Adiga, K. Balachandra Hebbar, Anil Kumar Yadav, 2023. Pollen morphological study and temperature effect on the pollen germination of cashew (Anacardium occidentale L.) varieties. *Scientia Horticulturae,* 314:111957.

Books/Book Chapters/Popular Articles

- Balasubramanian, D., Veena, G.L. and Thondaiman, V., 2023. Training manual on raw cashewnut processing and value-added products of cashew apple. Published by ICAR- Directorate of Cashew Research, Puttur, Karnataka, India, pp 110.

- Balasubramanian, D. 2023. Raw cashewnut processing. In. Short course on Improved crop production technologies in cashew with major emphasis on integrated pest management. Eds. K. Vanitha, Rajasekhara, H., T.N. Raviprasad, Shamshudeen, M. and Adiga, J.D. Published by ICAR-Directorate of Cashew Research, Puttur, Karnataka, India. pp: 204-214.

- Balasubramanian, D. 2023. 'Indian Cashew Processing- An Overview' and 'Entrepreneurs Development

in Cashewnut Processing – A Viable Approach for NEH Region', In. 'Training, demonstration of Improved technologies of cashew cultivation to the cashew growing small and marginal farmers' of Garo hills of Meghalaya' conducted by College of Community Science, Central Agricultural University (CAU), Tura, Meghalaya 28-30 March, 2023.

- Balasubramanian, D. 2023. Small scale agro processing: Case of India. In. International Webinar on strengthening International Trade and Investments in Africa – Agricultural commodities and investment opportunities conducted by World Business Society Club, Ivory Coast, West Africa on 16 March, 2023.
- Balasubramanian, D. 2023. Raw cashewnut processing. In. Cashew Production and Post-Harvest Technologies. Eds. Eradassappa, E., B Venkat Rao and Aswathy Chandrakumar. E-book published by ICAR-Directorate of Cashew Research, (ICAR-DCR), Karnataka and National Institute of Agricultural Extension Management (MANAGE), Hyderabad. pp: 102-109.
- Mohana, G.S., Eradasappa, E. and Savadi, S., 2023, Conservation and utilization of cashew genetic resources. In: Training manual on improved crop production technologies in cashew with major emphasis on integrated pest management. Eds. Vanitha, K.,Rajashekara, H., T.N. Raviprasad, Shamsudheen, M. and Adiga, J.D. 2023. ICAR- Directorate of Cashew Research, Puttur – 574 202. Karnataka. 231p. ISBN: 978-93-5813-110-9
- Mohana G.S., Vanitha, K., Rajashekhara, H. and Shamsudheen, M., 2023 Cashew Protect: An Artificial Intelligence (AI) based website and mobile app for identification of pests, diseases, and nutrient deficiencies in cashew. In: Training manual on improved crop production technologies in cashew with major emphasis on integrated pest management. Eds. Vanitha, K., Rajashekara, H., T.N. Raviprasad, Shamsudheen, M. and Adiga, J.D. 2023. ICAR- Directorate of Cashew Research, Puttur – 574 202. Karnataka. 231p. ISBN: 978-93-5813-110-9
- Savadi S., Muralidhara B. M., Adiga J. D., Rajashekara H., Manjesh G. N., Manjunatha, K., 2023. Biotechnological Interventions in Cashew. In: Training manual on improved crop production technologies in cashew with major emphasis on integrated pest management. Eds. Vanitha, K., Rajashekara, H., T.N. Raviprasad, Shamsudheen, M. and Adiga, J.D. 2023. ICAR-Directorate of Cashew Research, Puttur – 574 202. Karnataka. 231p. ISBN: 978-93-5813-110-9.
- Veena, G.L., Laxmi, M. and Rajashekharan,P.E. 2023. Pollen Cryopreservation in Mango. Pollen Cryopreservation Protocols, Springer Protocols Handbooks,https://doi.org/10.1007/978-1-0716-2843-0_16, Springer US, 625.
- Adiga, J.D.and Veena, G.L. 2023. Geru bele- onduPakshinota, Shramajeevikrushi magazine 2023.
- Manjunatha, K., Savadi, S., Adiga, J.D., Raviprasad, T.N., Shamsudheen, M., Manjesh, G. N., Thondaiman, V., Veena, G.L., Bhagya, H.P., Babli, M. and Aswathy, C., 2023. Applications of unmanned aerial vehicles (UAVs) for crop protection. In: Training manual on improved crop production technologies in cashew with major emphasis on integrated pest management. Eds. Vanitha, K., Rajashekara, H., T.N. Raviprasad, Shamsudheen, M. and Adiga, J.D. 2023. ICAR-Directorate of Cashew Research, Puttur – 574 202. Karnataka. 231p. ISBN: 978-93-5813-110-9

Variety .. Nethra Ubhaya

Technical bulletins / Extension Folders

Sl. No	Title	Glimpse of the publication
1.	Manjesh, G. N., Bhagya, H. P., Eradasappa, E., Veena, G. L., Siddanna Savadi and Manjunatha, K., 2023. Geru krushibesaayakramagalu. Extension leaflet. Published by Director, ICAR-Directorate of Cashew Research, Puttur -574 202. Dakshina Kannda, Karnataka	
2.	Manjesh, G. N., Bhagya, H. P., Eradasappa, E., Veena, G. L., Siddanna Savadi and Manjunatha, K., 2023. Cashew cultivation practices. Extension leaflet. Published by Director, ICAR-Directorate of Cashew Research, Puttur-574 202. Dakshina Kannda Dist, Karnataka.	
3.	Veena, G.L., Preethi, P. Rajkumar, A.D., Shamsudheen, M. and Manjesh G. N. 2023 Value added products of cashew apple. (Ver. English). ICAR-Directorate of Cashew Research, Puttur, Karnataka, 0:3.	

Conference/Symposium/Training attended/Training organized

Balasubramanian D.	Organized a training program on 'Cashewnut processing and value addition of cashew apples' for 'Farmers and Officers' of Meghalaya funded by MBMA, Meghalaya.	06.02.2023 to 10.02.2023
	Organized 3-days training for Incubatees (Ranganthappa, Ankur Agrawal, Ganapathy Mathesi) on cashewnut processing under IP&TM – ABI Scheme at Agri Business Incubationa Centre, ICAR-Directorate of Cashew Research, Puttur, D.K., Karnataka.	
	Attended a training programme (Virtual) on 'Start-up Masterclass Series 'conducted by IP&TM Unit, ICAR, New Delhi in collaboration with ABI, ICAR-IARI, New Delhi.	24.04.2023 to 18.05.2023

Technical bulletins / Extension Folders

Eradasappa E	Served as acourse co-coordinatorfor the short course on "Improved Crop Production Technologies in Cashew with major emphasis on Integrated Pest Management" organized by ICAR-DCR Puttur.	13.02.2023 to 20.02.2023
H. Rajashekara	Served as co-organizing secretary in organizing Platinum Jubilee Conference Plant and Soil Health Management: Issues and Innovations at University of Mysore, Mysuru, Karnataka in association with Indian Phytopathological Society (IPS), New Delhi	02.02.2023 to 04.02.2023
Thondaiman V	Participated in short course on "Improved Crop Production Technologies in Cashew with major emphasis on Integrated Pest Management" at ICAR-DCR, Puttur, Karnataka	13.02.2023 to 20.02.2023
Thondaiman V	Served as Co-convenor for the training on "Raw Cashew Nut Processing and Value-added products of Cashew Apple" conducted at ICAR-DCR, Puttur, Karnataka.	06.02.2023 to 10.02.2023
Veena G L	Served as Convenor for the training on "Raw Cashew Nut Processing and Value-added products of Cashew Apple" conducted at ICAR-DCR, Puttur, Karnataka. Acted as course co-coordinator assisted the short course training on "Improved Crop Production Technologies in Cashew with major emphasis on Integrated Pest Management" organized by ICAR-DCR Puttur.	06.02.2023 to 10.02.2023 13.02.2023 to 20.02.2023

3. News and Events

a) Programmes organized

Annual Cashew Day celebrated at ICAR-Directorate of Cashew Research, Puttur

The Annual Cashew Day-2023 was organized at ICAR-Directorate of Cashew Research, Puttur on 10.03.2023.An exhibition was arranged to displaying cultivation technologies and products of cashew nut and apple which was inaugurated by the invited guests. Dr. K.B Hebbar, Director, ICAR-CPCRI, Kasaragod, Kerala. Later, Dr. T.J. Ramesh, Senior Scientist and Head, ICAR-KVK, Mangalore, Karnataka spoke about the adoption of new technologies in cashew and trainings available for cashew cultivation. During the event, the cashew variety 'Nethra Ubhaya' (Dual purpose variety) was released. Besides, Cashew Protect app was released and the training manual on "Raw Cashew Nut Processing and Value-added products of Cashew Apple," an extension folder on "Cultivation of Cashew" and 'Cashew Protect app' were released for the cashew stakeholders. The chief guest of the event Shri. Gurunatha R Odugoudar, President, Gadag District Cashew Growers Association, Gadag, Karnataka addressed the event by emphasizing the marketing and value addition of cashew for doubling the farmers' income. During this programme, two progressive farmers viz., Shri. Vishwa Keshava Kuruveri and Shri Venkatesh Nanditalewere felicitated for their outstanding achievements and contributions in cashew cultivation, processing, and nursery management. The Cashew Day–2023 was presided by Dr. J. Dinakara Adiga, Director, ICAR-DCR, Puttur. During the event, the seed kits and brush cutter were distributed to the SCSP beneficiaries under the SCSP scheme. A total of 205 farmers had participated in this programme.

Foundation day celebration

ICAR- Directorate of Cashew Research celebrated its 'Foundation Day', marking the occasion with several new initiatives. The Foundation Day program was inaugurated by Mr. Girish Nandan, M., Assistant Commissioner, Puttur and Shri. Shree Padre, Editor, AdikePatrike. Dr. V. B. Patel, ADG (Fruits and Plantation Crops), ICAR, New Delhi, was the guest of honour. The program was presided over by Dr. J. D. Adiga, Director, ICAR-DCR, Puttur. Mr. Girish Nandan, who inaugurated the foundation day, stated that this Directorate developed various research technologies and varieties for the benefit of farming communities, particularly cashew growers. The foundation day lecture was delivered by Shri. Shree Padre on the topic 'Assumptions and realities in Agriculture.'

Dr. V. B. Patel also addressed the gathering virtually with a brief introduction on cashew research in India, the contributions of former directors of DCR in bringing about significant changes in research, the infrastructure development of cashew, etc. In a new initiative aimed at encouraging DCR scientists in research, this Directorate conferred the DCR best publication award to Dr. Siddanna Savadi, Scientist (Plant Biotechnology), for his research work on 'De novo transcriptome assembly and its utility in the development and characterization of the first set of genic SSR markers in Cashew. Various extension folders on 'Nutrient deficiency in Cashew: Symptoms and Management, 'Nethra Ubhaya: A Dual-Purpose Cashew Variety, and 'Inflorescence Pests of Cashew' were also released. More than 150 participants, including former directors of the institute, staff members, farmers, and representatives from various institutions, took part in the program.

ICAR sponsored Short Course

The ICAR-Directorate of Cashew Research, Puttur, Karnataka organized a ICAR sponsored short course on "Improved Crop Production Technologies in Cashew with Major Emphasis on Integrated Pest Management" from 13 – 20th February, 2023. A total of 19 participants from different research institutes/universities and KVKs from different parts of the country have participated in the short course. The short course covered important aspects on cashew IPM and included all the aspects of cashew production starting from nursery management to post harvest processing and value addition in detail with practical demonstrations and exposure visits during the program. The presentations comprised both inhouse and eminent guest speakers from other ICAR institutes on various aspects of cashew production technology

WIPO day:World Intellectual Property (IP) day celebration

World Intellectual Property (IP) day was jointly organized Agribusiness Incubation (ABI) centre and Institute Technology Management Unit (ITMU) of ICAR-DCR, Puttur on 26th April 2023. On the occasion, Smt. Chandravathy T., Advocate, Civil Court, Puttur was invited as the speaker to deliver talk on the theme Women in IP: Accelerating innovations and creativity. In the beginning, Dr. D. Balasubramanian, Principal Scientist (PHT) & PI (ABI), ICAR-DCR, Puttur delivered the welcome speech and highlighted the importance of IP with illuminating examples. Then Chief Guest delivered her talk the topic and emphasized on the IP role and woman contribution in the IP arena. Dr. Raviprasad TN., Director (i/c), ICAR-DCR, Puttur gave the presidential remarks after the guest speakers talk and shared his opinion on the IPs and women role.

International Women's Day programme

International Women's Day programme was organized on 8th March, 2023 at ICAR-DCR, Puttur. Mrs. Reshma, K., PS to Director, welcomed the Director, chief guest, and the staff of ICAR-DCR for the progarmme. Mrs. Annapoorna Sharma, an entrepreneur, Poorna Enterprises, Aryapu, Puttur, who was the chief guest of the programme delivered a talk on 'Gender Quality in entrepreneurship'. She mentioned that women are more powerful, multitasking and they deserve respect. Dr. K. Vanitha, Senior Scientist and Chairperson of Women Cell of

the Directorate made a presentation on 'Women work force in India – Challenges and Initiatives' during the occasion. Dr. J.D. Adiga, Director, ICAR-DCR presided over the function and expressed his wishes on International Women's Day - 2023. Then, there were cultural activities like singing and quiz for the staff. The programme ended with national anthem.

b) Meetings conducted (IMC/IJSC/RAC/IRC/Hindi etc.)

Institute Management Committee (IMC) Meeting

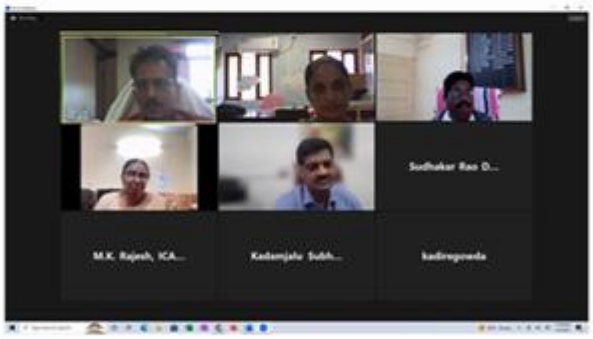
The 51th meeting of the IMC was held on 5th April 2023 under the Chairmanship of Dr. J. Dinakara Adiga, Director ICAR-DCR, Puttur. The Chairman informed the members about research and achievements of the Directorate. Various administrative and financial matters were discussed and finalized. Associate Director of Research, ZARS, Brahmavara (UAHS Shivamoga), Udupi; Shri Kadamajalu Subhash Rai, Kedambady , Puttur Dakshina Kannada District, Karnataka State (Non Official Member); Dr. M.K. Rajesh, Principal Scientist, ICAR-Central Plantation Crops Research Institute (CPCRI), Kasaragod, Kerala State; Dr. D.V. Sudhakara Rao, Principal Scientist, ICAR-Indian Institute of Horticultural Research, Bengaluru, Karnataka State; Dr. M.N. Sheela, Head, Crop Improvement ICAR-Central Tuber Crops Research Institute (CTCRI), Thiruvananthapuram, Kerala State; Dr. Vishaw Bandhu Patel, Asst. Director General (Hort-II), Indian Council of Agricultural Research (ICAR), New Delhi; Dr. Raghurama Kukkude Asst. Chief Technical Officer, ICAR-Directorate of Cashew Research (DCR), Puttur attended the meeting.

Institute Technology Management Committee (ITMC)Meeting

The 22nd Institute Technology Management Committee (ITMC) meeting was held on 13.04.2023 at ICAR-DCR, Puttur under the Chairmanship of Dr. J. Dinakara Adiga, Director, ICAR-DCR, Puttur. In the meeting commercialization of three varieties together as package, issuing of certificates to the innovators of technologies considered by ITMC for commercialization and recognition of the DNA fingerprinting (DNAFP) of cashew varieties / genotypes technology for commercialization and instituting a uniform DNA fingerprinting system for fingerprinting of the cashew varieties released in the AICRP system were discussed and decided.

Research Advisory Committee meeting

The third and last meeting of ninth Research Advisory Committee (27th RAC) of ICAR-DCR, Puttur was held during 7 & 8th June, 2023 at ICAR-DCR, Puttur on hybrid mode under the Chairmanship of Dr. N. K. Krishna Kumar, Former-DDG (Hort. Sci.), ICAR. Dr. J. D. Adiga, Director, ICAR - DCR, Puttur welcomed the Chairman, members of RAC and the scientists of ICAR - DCR. After the brief introductory remarks by the Chairman and the members, action taken report on the recommendations of 2nd meeting of the 9th RAC was presented by Dr. K. Vanitha, Member Secretary (9th RAC). The presentations on the research progress of the ongoing research projects presented by the scientists of ICAR-DCR. There were 48 research projects including eight



externally funded projects under nine mega projects. There were critical observations by the RAC on the research results and the recommendations were finalized after detailed deliberations. The RAC strongly recommended to take up the studies on influence of micronutrients on flowering, yield and quality of cashew; research interventions to enhance productivity of cashew including pheromone-based pest management, and also impact analysis of ICAR-DCR technologies. The meeting ended with the concluding remarks by the RAC Chairman and the members.

Agri-Business Incubation

Three incubates have registered with ABI and utilized 'State-of-the-Art' processing facility on the basis of 'Custom hiring' during the reporting period. Mr Ranganathappa, Karnataka, Mr. Ankul Agrawal, Uttar Pradesh and Ganapathy Anna Mathesi, Tamil Nadu have undergone three days training on 'Starting Cashewnut processing'. Since its inception, seventeen incubatees (60%) have ventured in to cashew business generating direct employment to the tune of 451 with an annual turnover of 13.31 Cr. Mentorship provided to incubatees on technical, management and market aspects. Revenue generated to the tune of Rs 5.13 lakh through training for incubates and technical consultancy under ABI. Startup convention, National Horticultural Fair, Mega Yantra Mela, Caju Utsav, Webinars, Lecture, Demonstration, Website, WhatsApp are the events and media through which services of ABI brought to public visibility. Awareness on business opportunities in cashew ecosystem generated through Business Meet, Entrepreneur Development Program (EDP), Lecture etc., Any further information, visit ICAR-DCR website https://cashew.icar.gov.in/

Training Programme on "Raw Cashewnut processing and value-added products of cashew apple" at ICAR-DCR, Puttur

The ICAR-Directorate of Cashew Research, Puttur conducted 5-days Training Programme on "Raw Cashewnut processing and value-added products of cashew apple" from 6th to 10th February 2023. This training programme was for the farmers and officials of the state of Meghalayasponsored by the Meghalaya Basin Management Agency. Dr. J. Dinakara Adiga, Director inaugurated the programme and addressed the research as well as technology adoption gaps. An overview of the accomplishments made in research with respect to Crop improvement, Crop management, Farm mechanization, Crop protection, Post-harvest technology and Transfer of technology including ICT initiatives were delivered by him. Mr. Saurabh Bose, Senior Manager, Megha-LAMP Project, Meghalaya explained the activities of Meghalaya Livelihoods Access to Market Project funded by International Fund for Agricultural Development and Govt. of Meghalaya, being implemented by the Meghalaya Basin Management Agency (MBMA). The training course consisted of class room lectures, hands on experience, visits to experimental fields, farmers' fields, and processing factories. Dr. D. Balasubramanian and team designed the training Programme content to equip the participants about the latest technological developments in raw cashewnut processing and value addition of cashew apple.

4. Transfer of technology

Advisory Visits / Consultancies / Lecturedelivered / Exhibitions

Balasubramanian D.	Participated in the 'Mega-Krishi Yanthra Mela' held conducted at Vivekananda College of Engineering and technology, Puttur, D.K., Karnataka. Participated 'National Horticultural Fair' conducted at ICAR- Indian Institute of Horticultural Research, Hessaraghatta, Bangalore from Delivered lecture on "Changing scenario in cashew nut processing and entrepreneurial opportunities for youth in India" at Alvas Institute of Engineering and Technology, Moodbidri. Karnataka Delivered technical lecture on "Cashew processing and value addition in India – viable opportunities and emerging challenges" during the One District – One Product (ODOP) webinar on plantation crops processing and value addition to be organized by NIFTEMT, Thanjavur, Tamil Nadu	10-12th February, 2023 22-25th March, 2023 20th June, 2023 23rd June, 2023
K. Vanitha	Delivered a talk on 'Women health in India: Challenges and welfare schemes' under AKAM webinar series at ICAR-DCR, Puttur. Delivered a talk on 'Women work force in India – Challenges and Initiatives' at ICAR-DCR, Puttur on the occasion of International Women's Day programme.	28th April, 2023 8th March, 2023
Eradasappa E	Participated in the 'Mega-Krishi Yanthra Mela' held conducted at Vivekananda College of Engineering and technology, Puttur, D.K., Karnataka. Delivered lecture on "Recently developed Cashew Varieties of ICAR-DCR, Puttur and their special features" in the national Conference is on 'Encashing technological innovations for production and productivity of Cashew at Bhubaneswar, Odisha organized by DCCD.	10-12th February, 2023 30-31st January, 2023

Eradasappa E	Delivered lecture on "Improved varieties and production technologies" in the training programme at ICAR-IIHR, Bengaluru for the farmers and Programme Implementation Agencies of NABARD TDF Projects on “Scientific management practices for fruit crop-based production systems” from 7th to 9th March 2023.	7th February, 2023
	Delivered lecture on “Improved cashew varieties in India and their suitability for processing” in the training programme on ‘Raw Cashewnut Processing and Value-added products of Cashew Apples, organized by ICAR-DCR Puttur	6-10th February, 2023
	Delivered lecture on “Cashew production technologies” in the Brainstorming Session and training programme on "Prospects of cashew cultivation in non-traditional areas of Karnataka" cum-distribution of Inputs under the SCSP scheme at Gadag in collaboration with ICAR-K.H. Patil Krishi Vigyan Kendra, Hulkoti, Gadag.	17th February, 2023
	Delivered lecture on “Improved cashew varieties for doubling the farm income of cashew farmers” in the Short Course on Improved Crop Production Technologies in Cashew with Major Emphasis on Integrated Pest Management organized by ICAR-DCR Puttur.	13-20th February, 2023
V. Thondaiman	Exhibited ICAR-Directorate of Cashew Research Technologies at Krishi yantra mela organized at Puttur	10-12th February, 2023
	Participated in Nursery Mela (Sasya Jathre) organized by SuddiMahiti Trust at Puttur to showcase the technologies, achievements, and activities of ICAR-DCR, Puttur and facilitated in explaining the information to farmers and other stakeholders.	7 to 8th January 2023
Rajashekara H.	Delivered a talk (online) on “Recent developments in blast disease of cereal crops” commemorating the occasion of International Plant Health Day at Department of Plant Pathology, Bihar Agricultural University, Sabour	12th May, 2023

Rajashekara H.	Delivered a lecture on 'Tribal empowerment in India: status and challenges' on 18th May, 2023 in the 'Azadi ka Amrit Mahotsav' lecture series of this Directorate. Delivered invited lecture on "Report of cashew leaf blight disease (CLB) caused by Neopestalotiposisclavispora from India" in Platinum Jubilee Conference Plant and Soil Health Management: Issues and Innovations at University of Mysore, Mysuru, Karnataka in association with Indian Phytopathological Society (IPS), New Delhi	18th May, 2023 2-4th, February, 2023
Siddanna Savadi	Delivered a lecture on the topic "Biotechnological Interventions in Cashew" in the Short Course on Improved crop production technologies in cashew with major emphasis on integrated pest management at ICAR-DCR, Puttur	13-20th February, 2023
Bhagya, H P	Exhibited ICAR-Directorate of Cashew Research Technologies at Krishi yantra mela organized at Puttur Participated and Exhibited ICAR-DCR Technology at the National Horticulture fair-2023 held at ICAR-IIHR, Bangalore	10-12th February, 2023 22-25th March, 2023.
Manjesh G N	Participated in Nursery Mela (Sasya Jathre) organized by SuddiMahiti Trust at Puttur to showcase the technologies, achievements, and activities of ICAR-DCR, Puttur and facilitated in explaining the information to farmers and other stakeholders. Provided advisory on the suitability of inter-cultivation of Coffee in existing Cashew orchards to the Horticulture Department of Jagadalpur, Bastar District, Chhattisgarh Delivered a lecture on Mechanization in harvesting of Cashew as part of the training program on "Raw Cashew nut Processing and Value-added Products of Cashew Apples" for the Farmers and Officials from Meghalaya state organized by ICAR-DCR, Puttur.	7 to 8th January 2023 02-03rd March, 2023 06th February 2023

Manjunatha K	Delivered a talk on Mechanization in plantation crops to reduce the cost of cultivation on 17.02.203 during the Short Course on improved Crop Production Technologies in Cashew with Major Emphasis on integrated Pest Management organized by ICAR-DCR, Puttur. Delivered a lecture on "UAVs for Smart Agriculture" in one day seminar on "Smart Farming in 5G Era" at ICAR-Central Plantation Crops Research Institute, Kasaragod, Kerala jointly organized by Telecom Regulatory Authority of India (TRAI), Bangaluru and ICAR-CPCRI, Kasaragod. Participated and Co-Coordinated in Mega-Krishi Yanthra Mela held at Vivekananda College of Engineering & Technology, Puttur.	17th February, 2023 1st March, 2023 10-12th February, 2023
Veena G. L.	Delivered a talk on Utilization of cashew apple and quality testing in the training program on "Raw Cashew nut Processing and Value-added Products of Cashew Apples" for the Farmers and Officials from Meghalaya state organized by ICAR-DCR, Puttur. Delivered a talk on value added products- sprouted cashew in the training program on "Raw Cashew nut Processing and Value-added Products of Cashew Apples" for the Farmers and Officials from Meghalaya state organized by ICAR-DCR, Puttur	8th February 2023 10th February 2023

5. Staff News

Recognitions/Awards

Dr. D. Balasubramanian

Editorial member of Journal of Plantation Crops published by Indian Society of Plantation Crops, ICAR-Central Plantation Crops Research Institute, Kasaragod, Kerala for the period from 2023-26.

Dr. Mohana G S

External expert member for selection of persons on contract basis under revolving fund scheme at Nettana, Kidu, CPCRI for coconut climbing during 25-01-2023

External Expert in selection committee for selection of YP- II under DUS center for Cocoa at CPCRI Vittal on 12-04-2023

Expert for the training program on "Cashew production technology" at the College of community Sciences, Tura, Meghalaya from 27-03-2023 to 30-03-2023.

Dr. Shamsudheen M.
Cleared Parangat Hindi Examination conducted by the Dept. of Official Language, Govt. of India

Dr. K. Vanitha
Served as chairperson of the selection committee of YP- 1 (Audit and Account section) held on 24.03.2023 at ICAR-DCR, Puttur.

Dr. Rajashekara, H
Co-organizing secretary in organizing Platinum Jubilee Conference Plant and Soil Health Management: Issues and Innovations from 2-4, February, 2023 at University of Mysore, Mysuru, Karnataka in association with Indian Phytopathological Society (IPS), New Delhi.

Nominated as member of Departmental Promotion Committee (DPC) for the promotion of office staff on 24.03.2023 at ICAR-DCR, Puttur.

Acted as an outside expert in selection committee for walk in interview of Project Fellow under the external funded project on 19.04.2023 at ICAR-CPCRI, Regional Station, Vittal.

Nominated as a member for selection of Young Professional-I for PC Cell of institute on 19.05.2023 at ICAR-DCR, Puttur

Dr. Siddanna Savadi
Received DCR Best Publication Award-2023 instituted by the Directorate for the research article 'De novo transcriptome assembly and its utility in development and characterization of the first set of genic SSR markers in Cashew' published in Industrial Crops and Products journal.

Dr. Bhagya, H P
Acted as external expert for selection committee for the field assistant post on a contractual basis under the project establishment of demonstration plots on areca nut dwarf hybrids funded by DASD, Calicut at ICAR-CPCRI RS, Vittal on 19.1.2023.

Dr. V. Thondaiman
Resource person (Outside expert) for selection of Project Fellow at ICAR-CPCRI-RS – Vittal on 06.03.2023.
Resource person (Outside expert) for selection of Project Assistants at ICAR-CPCRI-Research Centre, Kidu on 05.04.2023

Dr. Veena G L
Guided four MSc Food processing students from Department of Food processing PCRP College of Arts and Science, Periyar University Tamil Nadu
Nominated as a member for selection of Young Professional-I for PC Cell of institute on 19.05.2023 at ICAR-DCR, Puttur

Inter- Institutional Transfers

Sri. Nithiananadan. K.R, Administrative Officer from ICAR-Central Plantation Crops Research Institute (CPCRI), Kasaragod, reported for duty at this Directorate w.e.f 30.06.2023(FN).

Promotion

Sri Ravishankar Prasad, Senior Technical Assistant (T-4) has been promoted to Technical Officer (T-5) w.e.f. 28-07-2020.

Sri Honnappa Naik.P , Senior Technician (T-2)has been promoted to Technical Assistant (T-3) w.e.f. 21.01.2023.

Smt. K. Padminikutty , UDC has been promoted to Assistant w.e.f 28-3-2023

Retirement

Sri. P. Abdulla, CTO/FS (S), retired on superannuation on 31.05.2023.

Sri. HonnappaNaik.P, Technical Officer, retired on superannuation on 31.05.2023.

Sri. Veerappa, Skilled Support Staff, retired on superannuation on 30.6.2023.

6. Farmer's Corner

Cashew based Integrated farming system: A success story of a Women farmer with entrepreneurial skill

In life to achieve something, there should be a passion and perseverance. Here, a women agripreneur Mrs. Anitha M. who successfully practicing integrated farming is a source of inspiration and role model for all the women and other farmers of the Puttur taluk. For the last 15 years she is practicing integrated farming system approach along with organic cultivation for sustainable agriculture. She is cultivating crops like, cashew, arecanut, coconut, cocoa, black pepper, paddy, seasonal vegetables besides poultry, goat rearing and livestock as a component of integrated farming.

She has given importance for water conservation by adopting drip irrigation, rain water harvesting and farm ponds construction. Being an organic farmer, she producing the required fertilizers/manures for her field by composting agricultural wastes from her own plantation. She has a vermicompost unit and producing vermicompost throughout the year which improves the soil fertility. In summer season, she along with her family members prepares homemade snacks like sweet potato papad, jack fruit chips and other papads to sell in the local market.

Being enthusiastic and optimistic woman in agriculture, she actively participates in all the trainings offered by ICAR institutes, Krishi Vigyan Kendra, state agricultural universities and state agriculture/horticulture departments to learn the recent and advanced agricultural technologies. Also in many occasions, she served as a resource person for disseminating the integrated farming system to the local farmers.

Through the Atma yojana and ZBNF (Zero budget natural farming) she has gathered 80 local farmers to motivate them in agricultural activities and further she organized Samriddhi Raitha Gumpu for needy farmers to get financial assistance.

In recognition to her contribution in the field of integrated farming system, University of agriculture and Horticultural Sciences, Shivamogga awarded her with a certificate and memento. Furthermore, she has been recognized as a best progressive woman farmer 2021 at district level, Raitha Ratna Prashasti, Sankranthi Puraskar by Samskrithika Kala Kendra Bolwar-2012, Horticulture award from Mangalore 2016 etc.

7. Industry News

Finding New Consumers and Better Markets

In the early 1980s, Dr V N Madhav Rao, who was the founder scientist at the Cashew Research Station, Ullal, was invited to celebrate its 25th Anniversary. On that occasion, he made a stirring speech beginning with the sentence, "Cashew is a Dollar Earning Crop". The station had a remarkable pair of scientists, Dr Khan and Dr Hiremath who established rapport in the field of research with farmers and industries in a short span of the 3 years.In the 1980s, the World Bank program was initiated at the instance of the Government of India and provided a component for research.

An international approach to cashew development, the research component included the development of a package of practices, nutrition programs, and increases in the yield from the levels; but most important was the beginning area expansion. The favoured method from seedling to propagation was by air layering. Eventually, within a matter of a

decade, Cashew Research Stations developed softwood grafting as a better way to make available more and more hybrids and grafts. The hybrid program, which then had hardly below 10 hybrids, expanded to over 50 approved hybrids for the nation. The expansion of the crop in the area was more extensive in other nations

Currently, over 16 nations are major participants in the Cashew Development Programme, and the harvest globally has amazingly reached proportions unexpected of, in a period of just 40 years.Cashew is no longer considered as a luxury, nor can it be considered a comfort. It needs to be a necessity. A larger section of the population requires it to be a target. Therefore, cashew has arrived as an ingredient and food rather than the mere perception of a snack. Therefore, innovation and marketing will lead the way towards expansion in the consumption of cashew kernels. but it must be innovations in the realm of horticulture that will make the new cashew economy.

Points to ponder at this juncture are i) Generic promotion that is needed to make more consumers aware, is in the hands of the producers, i.e., farmers, not industry or manufacturers; ii) A catalytic role played by the Central and State Governments and institutions responsible for farmers; iii) World Organizations – WHO, FAO, UNCTAD, and UNIDO – to get cashew into the limelight and iv) Need to get involved in addressing multilateral fora, for example, G20 goals. Concepts to be followed for better markets are i) Relationship marketing; ii) Social marketing; iii) Efficient supply chains and iv) Specific targets in consumption.

Consumption should be at the bottom of the pyramid rather than at the apex.The consumer perception that it is expensive needs to be again translated into value for money. The French economist J. B. Say said, "Supply creates its own demand". The current developments in this industry should not be viewed as a series or set of problems, but otherwise as a set of opportunities.

(G Giridhar Prabhu, Chairman – Achal Group)

8. Statistics

Area, production, and productivity of cashew in India 2022-23

State	Area (In '000 Hectare)	Production (In '000 Tonne)	Productivity (In MT/Hectare)
Andhra Pradesh	197.92	132.31	0.67
Assam	1.05	1.16	1.10
Chhattisgarh	32.40	22.30	0.69
Goa	59.47	25.81	0.43
Gujarat	11.90	7.01	0.59
Jharkhand	15.58	6.60	0.42
Karnataka	138.58	77.85	0.56
Kerala	106.86	74.63	0.70
Maharashtra	191.58	197.30	1.03
Manipur	0.90	0.33	0.37
Meghalaya	8.78	10.38	1.18
Nagaland	2.00	0.55	0.28
Odisha	223.45	126.13	0.56
Puducherry	5.00	2.33	0.47
Tamil Nadu	173.24	80.39	0.46
Tripura	4.25	3.55	0.84
West Bengal	14.55	13.28	0.91
INDIA	1187.51	781.91	0.66

Source:Indiastat-https://www.indiastat.com/SubSection/DownloadTable?secid=1442148&ftype=xls# (Accessed on 22.08.2023)

Cashew export details (Value in Rs. Lakh Qty in MT.)

	2022-23	
Product	Qty	Value
Cashew kernel (whole)	44,271	2,67,747
Cashew Nuts Fresh/Dried in Shell	14,322	14,283
Purified and distilled Cashew nut shell liquid (CNSL) and Cardanol	6,607	5,708
Cashew nut shell liquid (CNSL)and crude	10,641	5,638
Cashew kernel (broken)	676	4,052
Other	305	789
Total	76,824	2,98,219

Source: APEDA Agriexchange
https://agriexchange.apeda.gov.in/indexp/MainheadPrdGrp_prdwise.aspx?gcode=%270701%27,%270702%27,%270703%27

AICRP News

Salient achievements

- 10 nos. of cashew germplasm have been identified and collected during the fruiting season 2023. (AICRP- Bhubaneswar)
- Identified two cashew germplasm lines during the reporting period at village Sadure, tahsil Vaibha wadi and village Navade, tahsil Vaibavwadi for In-Situ evaluation. (AICRP-Vengurla)
- Collected 3 germplasms from Paschim Medinipur district based on nut weight, disease and pest toler ance, cluster bearing and drought tolerance. (AICRP - Jhargram)

Training/Seminar/Conference-organized/attended

K. Umamaheswara Rao, Senior Scientist (Hort.) & Head and B. Nagendra Reddy, Scientist (Ento.)	RBK, Vizianagarm district (01.03.2023) Amalapadu village, Srikakulam district (02.03.2023)	Farmers training programme on cashew
K. Umamaheswara Rao, Senior Scientist (Hort.) & Head, Cashew Research Station, Bapatla	Rotary Community Hall, Jangareddygudem, Eluru District. (17.03.2023)	Advances in Cashew production technology sponsored by Directorate of Cashewnut and Cocoa Development, Cochin.
K. Umamaheswara Rao, Senior Scientist (Hort.)& B. Nagendra Reddy, Scientist (Entomology)	Dr. YSRHU- CRS, Bapatla. (29.03.2023)	Cashew Field Day sponsored by Directorate of Cashewnut and Cocoa Development, Cochin
K. Umamaheswara Rao, Senior Scientist (Hort.) & Head and Dr. B. Nagendra Reddy, Scientist (Ento.)	Dr. YSRHU- CRS, Bapatla (29. 05.2023 to 30.05.2023)	Cashew apple utilization and its value-addedproducts to the women self-help groups (SHGs)

B. Nagendra Reddy, Scientist (Ento)	ICAR- Directorate of Cashew Research, Puttur, Karnataka (13-02-2023 to 20-02-2023)	Attended short course on "Improved Crop Production Technologies in Cashew with Major Emphasis on Integrated Pest Management"

AICRP – Jhargram

	Jhargram block (06.01.2023) and Simlapal Block (01.02.2023)	Training to the cashew farmers on maintenance of cashew orchards, Jhargram District organised by West Bengal Accelerated Development of Minor Irrigation Project, GOWB.

AICRP- Madakkathara

Dr. Nasiya Beegum A.N. Assistant Professor	ICAR-DCR, Puttur (13.02.23 to 20.02.23).	Attended short course training programme on "Improved crop protection technologies in cashew with major emphasis on IPM".
Dr. Jalaja S.Menon	Thrissur (20,21 & 22 May 2023)	Attended 5th International congress on Kerala Studies in 2024- seminar on "Agriculture in Kerala:Challeges and future" and presented apaper on " Raising Production and Productivity-Recent Trends in Cashew Production".
	Cashew Research Station, Madakkathara (14/02/2022) Cashew Research Station, Madakkathara (21/02/2022). Ezhukone, Kottarakkara, Kollam (18/03/2023).	Conducted DCCD funded training programme on cashew apple utilization for unemployed women.

Training/Seminar/Conference organized/attended

	Kottopadam, Mannarkkad, Palakkad (25/02/2023) Kasaragod (21/03/2023) Cashew Research Station, Madakkathara (15/07/2023).	Conducted DCCD funded one day farmers training programme on cashew.
	Sahithya academy hall, Thrissur town (28/02/2023).	Conducted DCCD funded district level seminar on cashew.
	Cashew Research Station, Madakkathara 01/03/2023 to 02/03/2023	Conducted Transfer of Technology training programme on Value addition of cashew apple for scientists from Keladi Shivappa Nayaka University of agriculture and Horticulture Science, Shivamoga.
	Cashew Research Station,Madakkathara (10th to 12th April 2023)	Conducted Transfer of technology training programme on Value addition of cashew apple for Eleven members from Son Pandhar Sundhi Agro producer company, Limitted, Maharashtra.

AICRP – Paria

	Horticulture Research Station, Venkataramannagudem (19-21st January, 2023).	Scientists of AICRP-Cashew, RFRS,Vengurlacentre attended the "Annual Group Meeting of Scientists of AICRP on Cashew–2022 (AGM-2022)".
V. S. Desai, Jr. Entomologist (Cashew)	Commissioner of Agriculture, Maharashtra State, Pune (13th June, 2023)	Attended 1st state level steering committee meeting of "Crop pest Surveillance and Advisory Project (CROPSAP)
V. S. Desai Jr. Entomologist (Cashew)	Online mode (6th June, 2023)	Attended meeting on Decisive approaches for management of TMB.

AICRP-Bapatla

Umamaheswara Rao K and Dr. B. Nagendra Reddy organized farmers training programme on cashew on 13.04.2023 under SCSP at RBK, Annapanenivarigudem village, Elurudist. (No. of farmers attended: 100).

Umamaheswara Rao and Dr. B. Nagendra Reddy organized the farmers training programme on cashew on 10.05.2023 under SCSP sponsored by ICAR- Directorate of Cashew Research at Karagapadu village, East Godavari dist. (No. of farmers attended: 100).

Umamaheswara Rao and Dr. B. Nagendra Reddy organized the farmers training programme on cashew on 11.05.2023 under TSP at Muddappagudem village, Eluru dist.(No. of farmers attended: 100).

AICRP- Vridhachalam

A training on creating awareness about cashew cultivation and expanding cashew area in Tribal areas was conducted at Thavadanallur, Ariyalur District on 08.03.2023 under Tribal Sub Plan (TSP-AICRP).

A training on creating awareness about cashew cultivation and expanding cashew area in Scheduled Caste areas was conducted at Manakollai village of Kammapuram block, Cuddalore District on 24.03.2023.

A training on creating awareness about cashew cultivation and expanding cashew area in Scheduled Caste areas was conducted at Pelanthurai village of Vriddhacahalm block, Cuddalore District on 25.03.2023.

AICRP - Jhargram

• Training of Scheduled Caste Farmers (60 Nos) on different aspects of cashew cultivation technology at Jamboni block of Jhargram District on 03.03.23.

• Training of Scheduled Caste Farmers (60 Nos) on different aspects of cashew cultivation technology at Depal block of Purbamedinipur District on 21.03.23.

• Distribution of cashew grafts (@ 4nos. per farmer) to 60 SC farmers and fungicide, fertilizer, and manure under area expansion scheme of SCSP on 03.03.23 at Jamboni block of Jhargram District.

• Distribution of cashew grafts (@ 4nos. per farmer) to 60 SC farmers and fungicide, fertilizer, and manure under area expansion scheme of SCSP on 21.03.23 at Depal block of Purbamedinipur District.

• Training of Scheduled Caste Farmers (60 Nos) on different aspects of cashew cultivation technology at Depal block of Purbamedinipur District on 21.03.23.

• Demonstration of field layout for establishment of cashew orchard to tribal women at Paschim Medinipur district on 28.07.23.

AICRP- Madakkathara

AICRP-SCSP training programme for SC farmers conducted on 10/02/2023 at Muriyad, Thrissur

Programmes organized

AICRP-Bapatla

Dr. YSRHU- Cashew Research Station, Bapatla and ICAR-Directorate of Cashew Research, Puttur jointly organized the Annual Group Meeting of AICRP on Cashew- 2022 at Dr. YSRHU- Horticultural Research Station, VR Gudem on 19th – 21st, January, 2023. Dr. AK Singh, DDG, ICAR, New Delhi., Dr. V.B. Patel, ADG, ICAR, New Delhi, Dr. T. Jankiram , Hon'ble Vice Chancellor, Dr. YSRHU, Dr. Dinakar Adiga, Director and Project Coordinator, ICAR- DCR, Puttur, Dr. L. Naram Naidu, Director of Research, Dr. YSRHU and scientists from different AICRP cashew centres across the country were attended.

Organized the Rythu Sadassu at Narakodur village, Guntur Dist, on 18.03.2023 under RHWE Programme. Dr. R.V.S.K. Reddy, Associate Dean, NS College of Horticultural Sciences, Markapur attended as Chief guest and delivered the message on this occasion. This programme was presided by Dr. K. Umamaheswara Rao, Senior Scientist (Hort) & Head CRS, Bapatla, Dr. B. Nagendra Reddy, Scientist (Ento), CRS, Bapatla, Smt. P. Usha, Horticulture Officer, Ponnur, Dr. Aishwarya, Assitant Proffesor (GPB), Dr. Srikanth, Assitant Proffesor (Hort), local representatives from Godavarru, gundavaram Villages, VHAs of Bapatla and Chebrolu mandal also participated. Around 50 No's farmers attended the Rythu sadassu and they observed the specimens, charts and models displayed by the RHWEP students.

TRANSFER OF TECHNOLOGY

Advisory Visits / Consultancies/ Lecture Delivered / Exhibition

AICRP-Bapatla

K Umaamheswara Rao and B. Nagendra Reddy	• Field advisory conducted at Srinivasapuram village of Jangareddygudem division for advising on Tea mosquito bug control measures	17.03.2023
B. Nagendra Reddy, Scientist (Ento)	• Field advisory conducted at Buttayagudem mandal West Godavari District and suggested the management practices against flower and nut feeding pests • Field advisory conducted at Karagapadu village of Gopalapuram mandal East Godavari District and suggested the management practices against flower and nut feeding pests and farmers were advised to protect the young cashew plants in view of the raising temperatures through best management practices like mulching, protection with palmyrah leaves and protected irrigation	28.03.2023 28.03.2023
K Umaamheswara Rao	• Field visit to forest plantation at Alagayapalem village of Ulavapadu mandal. Observed the high yielding cashew trees and all are in full bloom stage • Technical advisory to group of farmers (10 No's) from Mohana Block, Gajapathi district of Odisha on advanced technologies in cashew production and grafting technique in cashew under exposure visit from Department of Horticulture, Odisha State.	28.03.2023
K Umaamheswara Rao and B. Nagendra Reddy	• Delivered a lecture on Advances in Cashew production technology and Pest and disease Management in Cashew in one day cashew workshop organized by Department of Horticulture, Govt. of Andhra Pradesh at RARS, Anakapalli	28.02.2023
K Umaamheswara Rao	• Hands on training on cashew nut processing and Vermicompost production technology for RHWEP students from NS College of Horticulture, Markapur • Field visit to cashew orchards at Jaladanki mandal of Nellore district and observed the TMB incidence in cashew.	20.02.2023 & 27.02.2023 20.02.2023 & 27.02.2023

K Umaamheswara Rao and B. Nagendra Reddy	• Field advisory conducted at Annapanenivarigudem village of Lingapalem Mandal and suggested the management practices against flower and nut feeding pests.	13.04.2023
B. Nagendra Reddy	• Visited the cashew orchards of Extension Training Centre, Bapatla and suggested the management practices against flower and nut feeding pests.	28.04.2023
K Umaamheswara Rao and B. Nagendra Reddy	• Field advisory conducted at Karagapadu village of Gopalapuram Mandal and suggested the management practices against flower and nut feeding pests	10.05.2023
K Umaamheswara Rao	• Visited the cashew orchards at Katrenipadu village of Nuzvid mandal, Eluru district where BPP-8 and BPP-9 varieties of cashew are introduced.	23.06.2023

AICRP-Jhargram

	• Meeting at Bankura District with WRIDD, GOWB officials on various aspects of cashew cultivation in the district	14.06.2023
	• Demonstration of cashew apple processing to women SHG group at RRS, BCKV, Jhargram	17.04.2023

AICRP- Madakkathara

Jalaja S Menon	• Served as a resource person in the DCCD National conference on cashew conducted at Odisha State convention Centre, Loka Seva Bhavan, Bhubaneswar.	30.01.2023 to 31.01.2023
Asna A.C.	• Attended the master trainers training programme under the scheme" The preparation and implementation of a technical module to develop and disseminate technical inputs on a regular basis for the farm plan-based production programme".	22.05.2023 to 24.05.2023
	• Conducted exhibition at Sahithya academy hall, Thrissur town as a part of District level seminar on cashew.	28.02.2023
	• Participated in the Thrissur pooram exhibition from 19th April to 29th May 2023.	19.04.2023 to 29.05.2023
	• Participated in the exhibition conducted at RARS, Pattambi as a part of Farmer – Scientist Interface.	30.05.2023

AICRP- Vridhachalam

	• Exposure visits on cashew value chain, especially on cashew plantation management, and cashew processing, under the South-South Knowledge Exchange (SSKE) programme funded by the World Bank.	03.01.2023 to 09.01.2023

TV / Radio talks

AICRP-Bapatla

K. Umamaheswara Rao Management of Cashew orchards in flowering season on 01.02.2023 JeedimamidiloYajamanyapaddathulu and kommakattirinpulu and Eruvula Yajamanyam on 23.06.2023

AICRP- Paria

S. K. Desai and S. G. Parmar DD Girnar Phone in live programme on Cashew scientific cultivation on 07.04.2023

Publications

Research Articles/Book Chapters/Others

• Asna, A .C. and Jalaja, S. M. 2022. Kashumanghasamskaranam (Malayalam) In: Libiya Baby, Prasantha K, Fathimathul Fadiya K.P. and Sourav K.S. (Eds) – Karshikavilakaludesamskaranavummoolyvvardhidhasandhydhakalum-ICAR – ARYA (Attracting rural youth in Agricultural). Training manual, ICAR KVK-Malappuram. Pp-36-41.

• Desai, V. S., Golvankar G. M., Talha P. M., Munj A. Y., Zote V. K. and Sawant B. N. 2023. Pocket diary on Management of Pest and Disease of Cashew in Marathi.

• Govekar, Y.R., Khapre, L.S., Deshmukh, S.V., Bhure, S.S. and Pawar, S.N. 2023. Effect of different bioinoculants on growth attributes of cashew grafts under nursery condition, Pharma Innovation 12(7): 1846-1848.

• Jalaja, S.M., Asna, A.C., Meera, V. M., Smitha, M.S. and Nasiya, A.N.B. 2022. Technology for commercial production of cashew sprouts, a traditional delicacy of Kerala-Journal of Tropical Agriculture 60(2):227-234.

• Manjusha, A.V.M., Laya, P.K., Premachandran, A. and Veena, M., 2023. First report of wilt disease in cashew (Anacardium occidentale L.) caused by Fusarium decemcellulare in Kerala, India. CABI Agric. Biosci 4(7). https://doi.org/10.1186/s43170-023-00142-w

• Rakesh, P., Subhendu, J., Subrata, D., Ashis, R. B., Mini Poduval & Sujit, K. R.,. 2023. Pestalotiopsis leaf spot: an important foliar disease in cashewnut seedling incited by Pestalotiopsisoxyanthi in West Bengal, India.Indian Phytopathology .https://doi.org/10.1007/s42360-023-00641-w.

Technical bulletins/Extension Folders/Leaflet

• Umamaheswara Rao, K., Nagendra Reddy, B., Dhanumjaya Rao, K., Omprasad,J., Ravi. Prasad, T.N., Adiga, J.D. and Mohana G.S. 2023. Impact of Dr. YSRHU technologies in Andhra Pradesh- Cashew. Published by Director of Research, Dr. YSR Horticultural University, Venkataramannagudem, Andhra Pradesh. Pp. 1-20.

• Umamaheswara Rao, K., Nagendra Reddy, B. and Naram Naidu, L. 2023. Jeedimamidisaagulomelakuvalu (Important techniques in cashew cultivation) in Telugu language. Published by Dr. YSR Horticultural University, Venkataramannagudem, Andhra Pradesh. Pp.1-6.

• Nagendra Reddy, B., Umamaheswara Rao, K., and Naram Naidu, L. 2023. Jeedimamidiniaasinchucheedapeedalu- Nivarana (insect pests of cashew and its management) in Telugu language. Published by Dr. YSR Horticultural University, Venkataramannagudem, Andhra Pradesh.Pp. 1-6.

Supply of Planting Material

• A total of 15000 cashew grafts of improved varieties were supplied. (AICRP-Bapatla)

Recognitions/Awards

• Sri Muppena Ramana Reddy, cashew farmer from Gopalapuram village of Devarapalli Mandal, East Godavari district received best cashew farmer from Andhra Pradesh during National Conference on Cashew held on 30.01.2023 and 31.01.2023 at OUAT, Bhubaneswar.

• The Cashew Research Station, Madakkathara was recognized nationally as the best AICRP centre on cashew for the year 2022 in the Annual Group Meeting held at
Dr. Y.S.R. Horticultural University, Andhra Pradesh in January 2023.

Compiled and edited by:
Manjunatha K., Veena G.L., V. Thondaiman and D. Balasubramanian
ICAR-Directorate of Cashew Research, Puttur -574 202.

हर कदम, हर डगर
किसानों का हमसफर
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Published by:
Dr. J. Dinakara Adiga
Director, ICAR- Directorate of Cashew Research, Puttur – 574 202, D.K., Karnataka.
Tel. No. 08251 – 230 902; Fax: 08251 – 234350; E-mail: director.dcr@icar.gov.in; Website: https://cashew.icar.gov.in