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**ALL INDIA COORDINATED RESEARCH  
PROJECT ON CASHEW**

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**PROCEEDINGS OF ANNUAL GROUP MEETING  
OF SCIENTISTS  
OF AICRP ON CASHEW – 2014**

**18 – 20<sup>th</sup> DECEMBER 2014**

*Venue : AGRICULTURAL COLLEGE, ANGRAU  
BAPATLA, ANDHRA PRADESH*



**ICAR - DIRECTORATE OF CASHEW RESEARCH  
PUTTUR-574 202, D.K., KARNATAKA**

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## **ALL INDIA COORDINATED RESEARCH PROJECT ON CASHEW**

ICAR - DIRECTORATE OF CASHEW RESEARCH

PUTTUR-574 202, D.K., KARNATAKA

### **ACKNOWLEDGEMENTS**

The Annual Group Meeting of All India Coordinated Research Project on Cashew was organized at Agricultural College (ANGRAU), Bapatla, Andhra Pradesh from 18-20<sup>th</sup> December 2014. The meeting was organized jointly by ICAR-Directorate of Cashew Research, Puttur (Karnataka) and Dr. YSRHU, V.R.Gudem, in which the besides AICRP research workers, scientific staff of Dr. YSRHU and progressive farmers had participated.

On this occasion, I express my deep sense of gratitude to Dr. N.K. Krishnakumar, Deputy Director General (Hort. Sci.), ICAR for his kind advice in organizing this Annual Group Meeting of Scientists of AICRP on Cashew-2014 as well as for his valuable suggestions during the Interaction and Plenary Sessions. I also express my heartfelt thanks to Dr. B.M.C. Reddy, Vice Chancellor, Dr. YSRHU for having inaugurated this Annual Group Meeting - 2014 and delivering the Inaugural address. I also express my sincere gratitude to Dr. J. Dilip Babu, Director of Research, Dr. YSRHU for his unstinting support and for providing necessary infrastructure facilities for conduct of this meeting. I place on record my thanks to the authorities in the ICAR, New Delhi and Dr. YSRHU, V.R. Gudem for the support in smooth conduct of this Annual Group Meeting.

I am thankful to Dr. P.C. Lenka, OUAT, Bhubaneswar for chairing the Crop Improvement session, Dr. K.R.M. Swamy, Former Principal Scientist (Hort.), IIHR and Dr. B. Prasanna Kumar, Principal Scientist (Hort.), Dr. YSRHU for chairing and co-chairing the Crop Management Session respectively and Dr. V. Ambethgar, Professor (Ento.), Horticultural College & Res. Institute for Women, Tiruchirappalli and Dr. P. Shivarama Bhat, Principal Scientist (Agrl. Ento.), ICAR-DCR for chairing and co-chairing the session on Crop Protection, respectively. My thanks are also due to all the rapporteurs of different sessions for recording and presenting the proceedings.

I am thankful to all the members of various Committees who have worked tirelessly for the successful conduct of this Annual Group Meeting, and all the scientific colleagues from the Coordinating Centers and Directorate of Cashew Research for their participation and cooperation in this Annual Group Meeting. I would like to make special mention about untiring efforts made by Dr. K.M.Yuvaraj, Head of Station and Dr. Umamaheswara Rao of Bapatla Centre in organizing this event. My thanks are also due to Dr. T.N. Raviprasad, Scientist-in-charge (PC Cell), Smt. Reshma K, PA and all DCR staff for the support extended in organizing this Group Meeting.

Puttur

Date : 29.12.2014

**( P.L. SAROJ )**

Director &

Project Coordinator (Cashew)

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## **PROJECT COORDINATOR'S REPORT**

**Prof. P.L. Saroj**

Director, DCR and PC, AICRP-Cashew

Respected Dr. B. M. C. Reddy, Hon'ble Vice-Chancellor of Dr. YSR Horticulture University and President of the Inaugural Session; and Chief Guest of Inaugural Session; Dr. J. Dilip Babu, Director of Research; our Guests of Honour Shri S.S.B. Raju, MD, Sagi Seeds, Andhra Pradesh and Shri M. Vidyasagara Rao, President, CMWA, Vetapalem; Special Invitees: Dr. K.R.M. Swamy, Dr. P.C. Lenka, Dr. V. Ambethgar, and Dr. L. Naram Naidu; distinguished delegates; scientists from DCR Puttur and AICRP-Cashew; invitees; media persons; ladies & gentlemen.

I would like to express my sincere thanks to all the dignitaries on the dais, delegates and invitees for making it convenient to be here for the inaugural function of the Annual Group Meeting of AICRP on Cashew. I take this opportunity to express my sincere thanks to the Hon'ble Vice Chancellor and other authorities of the University for hosting this Annual Group Meeting of AICRP on Cashew – 2014 at Cashew Research Station, Bapatla.

On this occasion, I am glad to present the Project Coordinator's Report. An independent All India Coordinated Research Project on Cashew was established in the year 1986 with its headquarters at the National Research Centre for Cashew at Puttur in 1986, which has been renamed as Directorate of Cashew Research in 2009. The AICRP on Cashew has a total of 14 Centres, of which Bapatla (Andhra Pradesh), Bhubaneswar (Odisha), Jhargram (West Bengal) and Vridhachalam (Tamil Nadu) are located on the eastern coast; Madakkathara and Pilicode (Kerala), Vengurla (Maharashtra) and Paria (Gujarat) are situated on the western coast. Further, three centres are located in non-traditional areas, at Hogalagere (in plains of Karnataka), Jagdalpur (Chattisgarh) and at Darisai (Jharkhand). Apart from these, three voluntary centres are also functioning under AICRP-Cashew at Kanabargi in Karnataka, Barapani in Meghalaya and at Goa.

All the centres of AICRP on Cashew have Regional Cashew Field Gene Banks (RCFGBs) wherein germplasm accessions are being maintained and their performance are being evaluated. The total germplasm collections till the date is 1370. Efforts are being made to intensify hybridization programmes by some Centres of AICRP Cashew to produce hybrids suitable for high density planting. The Centres of AICRP on Cashew has so far developed and released 40 high yielding cashew varieties for commercial cultivation in different eco-regions. The production potential of these varieties is very good and has played a significant role in improving production of raw cashew nut in the country.

Technologies developed by the Centres have been well accepted by the farmers and played a major role in augmenting their income. Plantations raised with high yielding varieties of cashew grafts and adoption of technologies developed by the Centres of AICRP on Cashew has helped in enhancing production and productivity of cashew. Around 5-6 lakh cashew grafts of high yielding varieties are being produced by different coordinating centres to meet the

growing demand of farmers and developmental agencies. The extension activities undertaken by the Centres have helped the farmers in cultivating cashew in a scientific way to fetch more income.

High density planting system has been found to be a promising technology in order to enhance productivity of cashew. Canopy management by adopting region specific and variety specific pruning methods to maintain optimum canopy in the high density planting and ultra-high density planting systems would be more beneficial in realizing higher yields by harnessing solar energy. Integrated nutrient and water management are crucial in cashew orcharding for improving productivity of quality nuts. In order to enhance the returns from unit cultivated area, different crops such as vegetables, tuber crops and pulses as well as medicinal plants have been evaluated over the years in different centres as intercrops in cashew orchard in the early stages of orchard life.

Tea Mosquito Bug (TMB) and Cashew Stem and Root Borers (CSRB) are the two major pests affecting the production and productivity of cashew. Intensification on management of tea mosquito bug and other foliage pests using newer molecules, feasible management strategies for Cashew Stem and Root Borers as well as evaluation of cashew germplasm tolerant to major pests are the need of the hour.

The AICRP Cashew Centre at Madakkathara has made tremendous progress in development of various products from Cashew Apple. More efforts are required to be made in utilization of large quantity of cashew apple which is being wasted to various products for human consumption or for industrial purpose. I would also like to mention that two new programmes on utilization of cashew apple for preparation of RTS and Jam as well as evaluation of germplasm for apple characters have been initiated during the last year and these trials are progressing satisfactorily.

Now, the Govt of India has taken major initiatives in area expansion of cashew by providing financial assistance to the tribal farmers through TSP Scheme and in North Eastern Hill States of the country through NEH Scheme. The National Horticulture Mission and Directorate of Cashewnut and Cocoa Development are also playing a pivotal role in cashew expansion programme in the country.

In this Annual Group Meeting, we will be reviewing the results obtained in various experiments under AICRP Cashew for the preceding year and formulate research programmes for the ensuing year to address the region specific problems in cashew cultivation. I would like to emphasize some of the salient results and also point out some of the issues which need our attention.

## **CROP IMPROVEMENT**

Indigenous cashew germplasm have been conserved and are being evaluated at all centres of AICRP-Cashew to assess their suitability for specific regions. The yield attributes are recorded to select promising accessions as parents in crossing programmes. From the evaluation of germplasm accessions conserved in different Regional Cashew Field Gene Bank's (RCFGBs) it was observed that Tiswadi-3 recorded the jumbo nut size of > 10g at Goa which

fetch a premium price. The accession RFRS 176 recorded the lowest mean height (5.7 m) at Vengurla. The highest mean apple weight was registered in Priyanka (125.09 g) followed by T.No.129 (65.0 g) at Bapatla. At Jhargram, JGM – 282 produced highest number of nuts/m<sup>2</sup> (70.1). The mean no. of nuts per panicle was maximum (23.00) in case of RFRS – 188 at Vengurla and this character can be utilized in hybridization. The highest cumulative yield/tree for 5 years was recorded at Jhargram in JGM–282 and JGM–299 with both yielding 39.7 Kg/tree yield.

### **CROP MANAGEMENT**

At Bapatla, cumulative nut yields (7 harvests) were highest in 10 x 5m spaced trees applied with fertilizer levels at 150:50:50 kg/ha [51.78kg/tree] and 58.56 kg/tree for 12 harvests at Bhubaneswar. In the drip irrigation trials mean annual nut yield, mean cumulative nut yield and shelling percentage were maximum at 80% CPE in Hogalagere, Vengurla and Vridhachalam. The maximum ground coverage by canopy i.e, 136.88 per cent was observed at Vengurla. It was observed that the estimated mean annual nut yield was 3.77 times higher in 4 x 4m in comparison to 8 x 8m in high density trials. Highest net returns were obtained by intercropping of ginger (Rs.2,98,000/-) at Madakkathara while okra could fetch Rs.42,123/- at Paria. Application of 25 % N as FYM + recycling of organic residue + in situ green manuring / green leaf manuring + bio-fertilizers (200 g) and recommended doses of fertilizer + 10 kg FYM (Control) could give higher cumulative yield of more than 20 kg/tree for 5 harvests at Vridhachalam Centre.

### **CROP PROTECTION**

For management of tea mosquito bug and other foliar insect pests, spraying of L-cyhalothrin has been found very effective in most of the centres. However, this insecticide being a synthetic pyrethroid alternative insecticide need to be further evaluated. At Vridhachalam, highest yield was obtained in recommended spray of TNAU followed by spray schedule comprising of neem oil soap alternated with L-cyhalothrin whereas all other centres reported highest yield in L-cyhalothrin spray. In most of the Centres, Imidacloprid and Acetamaprid were found to be promising in managing other regional foliage pests.

The lower tree density in all cashew growing tracts is due to destructive damage of yielding trees by cashew stem and root borers. However, post extraction prophylaxis (PEP) trials taken up by various AICRP-Cashew centres indicated that chlorophyriphos 0.2% could lead to better recovery, lower reinfestation and also the frequency of treatments was minimal. Regular adoption of phytosanitary measures such as removal of dead infested trees and CSRB infested cashew trees beyond the stage of recovery is absolutely essential in order to minimize the pest inoculum and maintain optimal tree density. Screening of cashew germplasm for level of pest infestation is being done on a regular basis, but till date, none of the cashew accessions were noticed to exhibit pest tolerance to incidence foliage pests.

## **TRANSFER OF TECHNOLOGY**

The coordinating centres of AICRP are also involved in transfer of technology activities and have produced more than 5.75 lakh cashew grafts during 2013-14 which were distributed to cashew farmers, government and non-government organizations. Frontline demonstration plots have been laid out by different centres to disseminate the recent production techniques with backup of necessary technical guidance. It is worth mentioning that the Centres of AICRP on Cashew have conducted 35 training programmes on different aspect of cashew cultivation and management practices in which around 1500 farmers participated.

I trust that all the delegates will agree that the efforts put in by scientists of AICRP Cashew Centres in terms of producing quality planting material, conducting training programmes on various themes including crop production, and plant protection activities and post harvest management have led to a wider awareness and helped to popularize the cashew technology among farmers. I sincerely hope that all scientists of AICRP-Cashew will be earnestly implementing the approved technical programmes for their centres as well as, the decisions that will be taken in this Annual Group Meeting. I would like to express my deep sense of gratitude to the Hon'ble Deputy Director General (Hort.) Dr. N.K. Krishna Kumar for his continued guidance and support from the Council. I also wish to thank Dr. B.M.C. Reddy, Vice Chancellor, Dr. YSHRU for kindly agreeing to host this Annual Group Meeting at CRS, Bapatla and all his colleagues for extending necessary support for organizing this Group Meeting. Thanks are also due to Dr. T. Janaki Ram, Asstt. Director General (Hort. Science), ICAR and all the guest and experts who are supporting me in different ways.

Before I conclude my report, I would like to thank all my scientist colleagues of the coordinating centres of AICRP on Cashew; Directors of Research, Deans and other University authorities for extending cooperation for the effective functioning of the AICRP work in their respective centres. I sincerely acknowledge the cooperation and technical support received from my colleagues at DCR, Puttur particularly Dr. T.N. Raviprasad, Principal Scientist & Scientist-in-charge of PC Cell and Mrs. K. Reshma, Personal Assistant which has enabled me to run the day-to-day work of the Project Coordinator's Cell smoothly.

## **PRESIDENTIAL ADDRESS**

**Dr. B.M.C. Reddy**

Hon'ble Vice-Chancellor

Dr. Y.S.R. Horticultural University

Prof. P.L. Saroj, Director, Directorate of Cashew Research and Project Coordinator (AICRP on Cashew), Puttur, Shri. S.S.B. Raju, M.D., Sagiseeds, Hyderabad, Shri. M. Vidyasagara Rao, President, CMWA, Vetapalem, Dr. J. Dilip Babu, Director of Research, Dr. L. Naram Naidu, Zonal Head, HRS, Guntur, guests, delegates from different centres of AICRP-Cashew, invitees, media persons, University staff, ladies & gentlemen. On my own behalf I welcome you all at Bapatla, College of Dr. YSRHU, Andhra Pradesh.

I am happy to be present here on the occasion of Annual Group Meeting of AICRP on Cashew at Bapatla, which is one amongst the earliest centres of AICRP-Cashew and engaged in research on cashew for the last four decades. Cashew has now shed the image of soil conservation crop and attained the status of a commercial tree nut in India. The research efforts by the AICRP Cashew Centre, Bapatla has led to the establishment of Regional Cashew Field Gene Bank comprising of more than 130 diverse germplasm accessions collected indigenously.

Currently, the area under cashew is 9.82 lakh ha with a production of about 7.28 lakh tonnes at national level, of which Andhra Pradesh accounts for an area of 1.84 lakh ha with a production of about 1.18 lakh tonnes. However, the productivity per hectare in the state is 646 kg/ha which is considerably lower than that of the national average of 772 kg/ha. It is learnt that the established processing capacity in India is to the tune of around 14 lakh tonnes annually. However, the shortfall is about 4.50 lakh tonnes. Hence, there is ample scope for increasing cashew area in the states of Andhra Pradesh, Odisha and Tamil Nadu on the east coast which are the major cashew cultivating states.

It is of utmost importance to conserve the available variability in the country. It has come to my notice that AICRP on Cashew has a diverse germplasm collection 1370 accessions for utilization in future breeding programmes. Breeding programmes need to be directed towards developing varieties tolerant to biotic and abiotic stresses. DNA finger printing using RAPD and ISSR markers has revealed moderate diversity in cashew germplasm. Hybridization programmes should be intensified by all Centres of AICRP Cashew for exploitation of heterosis.

Standardisation of softwood grafting has ensured sufficient availability of quantity planting materials which has enabled faster expansion of area under cashew. Currently, over 57 lakh grafts are being produced and distributed annually in the country both by Government and private nurseries, which is a commendable achievement.

Intercrops can be taken up in the initial years of planting to get more returns by utilizing the resources efficiently. Research at several AICRP-Cashew centres has demonstrated the

advantage of cultivating either vegetable crops, grain crops or medicinal crops to augment the income during initial cropping period.

Cashew is generally grown as a rainfed crop, however research has indicated that it responds considerably to irrigation during summer months. Micro irrigation can be adopted wherever feasible prior to flowering and terminated subsequently to induce slight water stress to initiate flowering and restarted during the fruiting period to retain fruit set. In order to ensure proper establishment and growth of cashew, soil and moisture conservation techniques need to be adopted. Precision farming involving nutrient budgeting, soil and water conservation and high density planting which can suit to a specific location needs to be investigated.

Realization of the potential yield of cashew is generally constrained by pest attack. The foliar pest, tea mosquito bug inflicts severe damage on vegetative and reproductive parts thereby drastically reducing the yield. Of the several insecticides evaluated for management of tea mosquito bug (TMB); Lambda-cyhalothrin and Profenophos have been found to be efficient in managing the pest. On the other hand Cashew Stem and Root Borer (CSRB) generally does internal damage on the bark portion of main stem of cashew but evades notice by cultivators till canopy yellowing occurs. Regular survey for initial symptoms and physical removal of grubs followed by swabbing and drenching of chlorpyrifos as post extraction prophylaxis (PEP) and adopting regular phytosanitation practices in CSRB infested plots which involves removal of dead trees and severely infested trees can significantly reduce fresh pest incidence. Developing an IPM strategy for pest management in cashew is essential for reducing yield loss due to these two important pests. Of late other minor foliage pests such as leaf miner, leaf and blossom webber, apple and nut borers have also been reported to cause significant yield loss in cashew.

I understand that, AICRP on Cashew has developed and maintained good rapport with NGO's and development agencies, and laid out demonstration plots on new cashew production technologies in the farmers' fields in order to demonstrate the usefulness of improved technologies. This will help in enhancing the production of raw cashewnut and make the country self-sufficient in meeting the demand of processing industries.

Homestead processing and utilization of cashew apple into value added products can add to the income levels of the cashew farmers. I hope that these points will be taken into consideration during the deliberations in the ensuing technical sessions and also in planning of technical programmes for implementation during the next year.

I am looking forward for the active and useful interactions by all participants in the deliberations of this Group Meeting and I wish the Group Meeting of AICRP Cashew all the success in its endeavour. I am also thankful to Dr. P.L. Saroj, Director & PC (AICRP-Cashew) and also ICAR authorities for selecting this venue and also giving an opportunity to preside over the inaugural session.

## TECHNICAL SESSION – I : ACTION TAKEN REPORT OF AGM-2013

Chairman : Dr. B.M.C. Reddy, VC, Dr. YSHRU  
 Co-chairman : Prof. P.L. Saroj, Director, DCR & Project Coordinator (AICRP on Cashew)

Action taken report on major recommendations of the Annual Group Meeting held at BCKV, Kalyani, West Bengal was presented by Dr. T.N. Raviprasad, Principal Scientist (Ento) & Scientist-in-charge, PC Cell, DCR, Puttur.

Sl. No.	DECISIONS OF AGM-2013	ACTION TAKEN BY THE CENTRE
<b>CROP IMPROVEMENT</b>		
1.	Sex ratio of hermaphrodite and male flowers is to be re worked as per the methodology indicated in Annexure	Sex ratio has been calculated as per the methodology mentioned in the proceedings of AGM 2013.
2.	Germplasm trials at Chintamani need to be discontinued and all germplasm accessions existing there may be transferred suitably and further maintained at Hogalagere	Till date, 53 germplasm accessions existing in Chintamani have been transferred to HREC, Hogalagere. The remaining accessions (58) will be shifted at the earliest.
4.	Details of germplasm collection of different Centres should be submitted to PC cell. I.C. number has to be obtained for all the germplasm available in the respective RCFGB.	Complete and compiled details of germplasm yet to be submitted by the Centres. Few centres have obtained IC Nos. for earlier collections.
5.	In non-traditional area, cashew varieties performing well under lower temperature conditions (<10° C) to be identified and evaluated.	Few cashew varieties having early flowering in the region have been identified and are being characterized.
6.	The performance of H-303, H-320, H-32/4 under MLT-II and MLT-III to be submitted to PC cell by all the Centers.	Details of performance of H-303 and H-320 and H-3/24 has been submitted by Bhubaneswar, Hogalagere and Vengurla Centre. H-303 has been recommended for cultivation in Odisha during 2012 and at West Bengal. Release proposal will be submitted by Vengurla Centre.
7.	Released varieties included in the trial needs to be invariably indicated by name instead of their accession number.	Name of released varieties have been indicated by the centres with accession number in parenthesis.

8	It was advised to bring out a catalogue of the germplasm accessions available at Vridhachalam, by referring the Catalogue of Minimum Descriptors of Cashew Germplasm Accessions brought out by DCR.	The catalogue of available germplasm has been compiled by Vridhachalam Centre.
9	Scion Bank to be established at Tura centre based on varieties suited to the region.	Scion bank not yet established.
10	In general, germplasm should be planted at wider spacing for (7.0m x 7.0m) for better expression of its characters.	Due to space constraint and uniformity with earlier planted material, the earlier spacing is being continued.
<b>CROP MANAGEMENT</b>		
1.	Year of planting/ age of plant and recommended dose of fertilizer, and soil nutrient status in high density trials should be mentioned.	Followed
2.	Refinement of organic treatments needs to be done to substitute FYM by having group discussion at DCR, Puttur.	A group discussion for substitution of FYM by organic source was held at DCR on 19.05.2014 and specific treatments have been indicated for respective centres based on availability of local organic materials.
3.	Centres which have not initiated varietal trials on varietal screening of cashew apple for RTS and Jam should initiate the trials during cropping season of 2014.	Already initiated during the cropping season of 2014
4	In cropping system experiments, variety of intercrops evaluated should be mentioned and pest infestation in cashew as well as intercrops needs to be recorded.	Details of variety of the intercrops has been mentioned during reporting.
5	Trial should be initiated to evaluate Jhargram-2 at all allotted centers immediately by lifting grafts from Jhargram Centre.	Details of the trials not mentioned so far by the Centres.
<b>CROP PROTECTION</b>		
1	Observations on TMB and CSRB infestation in nutrient management trials should also be recorded.	Observations have been recorded and will be presented by the Centres.
2.	Insect pests and natural enemies with scientific name need to be presented. Specimens of TMB and CSRB should be sent to DCR, Puttur for correct identification and DNA fingerprinting at NBAll.	Followed  Specimens have not been received from the centres, so far.

3.	Infestation damage on cashew apple should be recorded.	Damage levels have been recorded by the Centres and will be presented during the technical sessions.
4.	Application of copper oxy-chloride to be taken up to avoid fungal infection of CSRB damaged bark.	Yes. Being followed.
5.	Alternatives to Chlorpyrifos need to be explored as this insecticide is being phased out.	Alternatives insecticides are yet to be finalized. This will be discussed in the Crop Protection session.
6	The experiments on management of TMB and other foliage pests should be concluded after reviewing the results of consecutive five years.	To be finalized during the Crop Protection session.
7	All banned pesticides eg. lindane and carbaryl need to be deleted from the treatments.	These insecticides have been deleted from the trials.
8	Rejuvenation and management of CSRB has been demonstrated successfully at DCR. The protocol for rejuvenation of cashew orchards and effective management of CSRB subsequently should be published in the form of a bulletin / technical folder.	Technical bulletin has been published by DCR.
9	Sealer-cum-healer developed by IIHR may be evaluated for recovery of CSRB infested trees. The interested centres may send their requirement to PC Cell.	No Centre has requested the material, however the details of availability of material communicated to all Centres for needful.
10	Occurrence of diseases in cashew, especially blossom blight and die-back should be recorded along with the weather conditions and period of occurrence.	Information not received from the Centres so far.
	<b>INTERACTION BETWEEN DEVELOPMENT DEPARTMENTS &amp; RESEARCH CENTRES</b>	
1	An orientation course should be organized for all newly joined scientists at different AICRP Centres.	Orientation organized for the newly joined scientists of AICRP – Cashew at DCR during 19 -22 May 2014.
2	It was suggested that one village in the vicinity of research centres is to be adopted, every year for disseminating various technologies in cashew.	So far, this activity has not been communicated by the Centres.

# **ALL INDIA COORDINATED RESEARCH PROJECT ON CASHEW**

ICAR - DIRECTORATE OF CASHEW RESEARCH

PUTTUR-574 202, D.K., KARNATAKA

## **RECOMMENDATIONS OF AGM – 2014**

The major recommendations of the Annual Group Meeting of AICRP-Cashew held during 18-20<sup>th</sup> December 2014 at Agricultural College, Bapatla, Andhra Pradesh are presented below.

### **Crop Improvement**

1. Survey of cashew germplasm may be continued for characters like; higher yield ( $\geq 8.0\text{kg/tree}$ ), big nut ( $\geq 6.5\text{g}$ ), cluster bearing ( $\geq 8$  nut/cluster), big apple ( $\geq 80.0\text{g}$ ), tolerance to pests and other desired/ unique traits.
2. The field maintenance of cashew germplasm should be done at two-three major locations only as Regional Cashew Field Gene Bank.
3. For releasing any region-specific variety, the compiled data must be presented during the AGM and only after recommendation of the house, it may be proposed for release. Generation of data under AICRP and releasing the variety at University level is not permissible.
4. The breeding programme in cashew may be intensified only in those Centres where there is strength and resources like; Bapatla, Bhubaneswar, Jhargram, Madakkathara, Vengurla and Vridhachalam.
5. Regarding removal of evaluated cashew germplasm, it is advised that only duplicates should be removed after proper ascertaining. Under hybridization programme, inferior hybrid progenies after evaluation can be removed.

### **Crop Management**

1. In high density planting trials, the effect of fertilizer application in main plot, sub-plot and interaction effects should be worked out and presentation shall be made accordingly.
2. In order to validate the effect of bio-fertilizer consortia, all the Centres should procure the consortia from only one source i.e., IIHR, Bangalore.
3. The value added products developed by any AICRP Cashew Centres must reflect 'Developed under AICRP-Cashew' on the label of the product.

### **Crop Protection**

1. A group meeting of entomologists of AICRP-Cashew may be organized at DCR to finalize treatments including new generation insecticides for management of both TMB and CSRB. Newer insecticides such as Spinosad / Chlorantraniliprole / Fipronil need to be included for evaluation.
2. It is suggested to monitor the resurgence of other minor insect pests in treatments having all the three rounds of sprays using same insecticide has been done for control of TMB.
3. As management of TMB was consistently effective with Acetamiprid treatment the benefit cost ratio needs to be worked out.
4. The information generated on physical attributes of cashew trees showing recovery / non-recovery after CSRB attack during the last eight years should be compiled and brought out as publication by the centres in their respective regional language.

### **Transfer of Technology**

1. State-wise detailed publication on 'Status of Cashew' should be brought out by the centres with the help of PC Cell.
2. Exposure visit of cashew farmers to DCR should also be conducted.
3. Considering the demand of planting materials, Bapatla Centre is given target of 1 lakh cashew grafts/year. The Centre may also explore possibility of development of nursery in PPP mode.
4. In all publications based on AICRP works, AICRP-Cashew must be cited.

### **New Initiatives**

1. It was suggested that the PC Cell may initiate necessary action for expansion of AICRP Centres in the states like Telangana, Madhya Pradesh, Andaman & Nicobar and NEH states.
2. Possibility may be also explored for expansion of cashew in Bundelkhand region and Chitrakoot areas.

## TECHNICAL SESSION I: CROP IMPROVEMENT

Chairman	:	Dr. P.C. Lenka, OUAT, Bhubaneswar
Rapporteurs	:	1. Dr. R. C. Gajbhiye, Horticulturist, RFRS, Vengurla 2. Mr. R. T. Patil, Assistant Professor, HRES, Kanabargi

### Gen-1: Germplasm collection, conservation, evaluation and cataloguing.

#### Bapatla:

- It was suggested to collate data of 13 years and conclude the experiment.
- As the variety Priyanka is performing better than other accessions it may be recommended for cultivation of coastal sandy soils of Andhra Pradesh.
- The grafts of best performing accessions, should be planted at a wider spacing of 7m x 7m to obtain accurate data of their performance.

#### Bhubaneswar

- DNA finger printing of germplasm accessions need to be taken up at DCR, Puttur to down size the collection by avoiding duplicates.
- The existing accessions should not be cut-off. Also obtain IC Nos. from NBPGR.
- The shelling percentage is to be calculated as per guidelines given in the experimental manual.

#### Hogalagere

- It was suggested that all germplasm existing at Chintamani should be immediately shifted to Hogalagere centre for conservation.
- It was suggested to compile all the data of germplasm and submit to PC Cell for final decision by PC, AICRP cashew to avoid duplicates.

#### Jagdapur

- The performance of cashew accession NRC 137, NRC 138, NRC 193 and NRC 194 needs to be confirmed for consistency at DCR. Based on the results they may be clonally multiplied and planted at new location of Cashew Research Station, Lamker, Bastar for further evaluation.

#### Jhargram

- JGM-137, JGM-138 and JGM-191 were found promising and it was suggested to submit compiled data to PC Cell, DCR, Puttur. For statistical analysis take the help of DCR scientist.

#### Madakkathara

- It was suggested to conclude the experiment and submit the final report to PC Cell, DCR, Puttur.

#### Pilicode

- It was suggested to recheck shelling percentage.
- It was suggested to continue the experiment for 2 more years.

**Vengurla**

- Only the best performing accession RFRS-172 should be clonally multiplied and planted at wider spacing. The trial may be concluded.

**Vridhachalam:**

- Regarding removal of low yielding accessions, clarification will be sought from NBPGR and decision will be taken after getting clarification.

**Darisai**

- It was informed that primary data of Gen-1 trial should be submitted to PC Cell, Puttur immediately.

**Tura**

- It was suggested to collect more number of scions (more than 50) from promising germplasm accessions to ensure graft success.
- Accession which is flowering during December should be observed for fruiting and photograph of panicles should be e-mailed to DCR, Puttur.

**Gen 3: Varietal Evaluation Trials****1. Multi-location Trial-II****Jagdapur**

- It was suggested to prepare more number of grafts of test entries for shifting of experiments to new location of Cashew Research Station, Lamker.

**Jhargram**

- Conclude the trials and submit the data to PC Cell, Puttur.

**Madakkathara**

- Conclude the trials and submit the data to PC Cell, Puttur.

**Vengurla**

- Conclude the trials and submit the data to PC Cell, Puttur.

**2. Multi-location Trial-III****Bhubaneshwar**

- The performance of BH-85 needs to be properly documented for some more years based on its better performance.

**Hogalagere**

- H 32/4 may be recommended for dry zone of Karnataka. At least 100 grafts should be prepared for planting in a compact block for evaluation.

#### **Madakkathara**

- Suggested to verify data on mean nut weight of Goa 11/6 which was very high and submit the data to PC Cell, Puttur.

### **3. Multi-location Trial-V**

#### **Jagdapur**

- It was suggested to collect the remaining test varieties from respective centre during this year for planting during next season at newly selected area, at Cashew Research Station, Lamker.

#### **Jhargram**

- Suggested to recheck the data of shelling percentage of Jhargram-1 and submit the same to DCR, Puttur

#### **Pilicode**

- Recheck the data on nut weight of Priyanka variety and submit the same to PC Cell, Puttur.

### **4. Multi-location Trial-VI**

#### **Kanabargi**

- Replanting of MLT VI is to be done as the number of trees in the trial is very low.

#### **Tura**

- The centre should take up planting of MLT VI during 2015.

#### **Darisai**

- The centre should immediately take up planting of MLT VI (during 2015) with the varieties identified in the earlier AGM.

### **Gen-4: Hybridisation and Selection**

#### **Bapatla**

- Suggested to compile all the data on performance of existing hybrids and submit to PC Cell. Also to prepare release proposal of H-36 and H-76 which should be presented in Annual Group Meeting- 2015.

#### **Bhubaneshwar**

- Suggested to compile all data on performance of existing hybrids and proposal may be prepared for release of 2 -3 most promising hybrids at state level with intimation to PC Cell.

#### **Hogalagere**

- Suggested to verify data on flowering duration of all hybrids as mean values are outside the range.

**Goa**

- The hybrid H-31/05 is giving high yield and needs to be observed for yield consistency.

**Madakkathara**

- The earlier yield data of hybrids H-21 and H-36 needs to be compiled and the same can be clonally propagated.

**Vengurla**

- Regarding removal of poor performing F1 hybrid, it will be communicated subsequently after discussion with NBPGR.
- Best performing H-777 and H-1174 may be multiplied by grafting for further planting at wider spacing.

**Gen 5: Characterisation of Germplasm for cashew apple****Bhubaneswar**

- Due to unavailability of facilities the trial may be discontinued at the Centre.

**Jagdapur**

- Prepare grafts of good clonal material and distribute to other station for evaluation.

**Jhargram**

- It was suggested to use at least 1 kg of apple for recording juice percentage.

**Vridhachalam**

- Suggested to mention appropriate units while presenting the data.

**Programmes allotted to different Centers of AICRP on Cashew  
for the next year – 2015-16**

<b>Programmes</b>		<b>Centres</b>
Gen.1.	Germplasm collection, conservation, evaluation, characterization and cataloguing.	Bhubhaneswar, Hogalagere, Darisai, Lamker, Jhargram, Paria, Pilicode, Vridhachalam, Kanabargi, Tura and Goa.
Gen. 3.	Varietal evaluation trial	
	Multilocation trial – II (earlier MLT–1992)	Bapatla, Bhubhaneswar and Lamker
	Multilocation trial–III (earlier MLT–2002) (Planted during 2003)	Bapatla, Bhubhaneswar, Hogalagere, Madakkathara, Vengurla and Vridhachalam.
	Multilocation trial–V (performance of released varieties)	Bapatla, Bhubhaneswar, Darisai, Hogalagere, Jhargram, Lamker, Madakkathara, Paria, Pilicode, Vengurla and Vridhachalam.
	Multilocation trial–VI (Special MLT)	Darisai, Paria, Kanabargi, Tura and Goa.
Gen. 4.	Hybridization and selection	Bapatla, Bhubhaneswar, Goa, Hogalagere, Jhargram, Madakkathara, Pilicode, Vengurla and Vridhachalam.
Gen. 5.	Characterization of germplasm for cashew apple	Bapatla, Jhargram, Lamker, Pilicode and Vridhachalam

## TECHNICAL SESSION II : CROP MANAGEMENT

- Chairman : Dr. KRM. Swamy, Former Principal Scientist (IIHR)
- Co-chairman : Dr. B. Prasanna Kumar, Prin. Scientist (Hort), PHRS., Dr YSRHU
- Rapporteurs : Dr. S. Jeeva, Horticulturist, Vridhachalam  
Dr. D. Balasubramanian, Principal Scientist, ICAR- DCR

### Hort. 1: Nutrient Management for Yield Maximization in Cashew

#### Bhubaneswar

- Experiment will be continued

#### Hogalagere

- The yield data on interaction effect are to be checked
- The final report is to be submitted to PC Cell, Puttur

### Hort. 2: Fertilizer application in high density cashew plantation

#### Bapatla

- The data needs to be subjected to statistical analysis as per split plot design.
- Provide yield/hectare basis.
- Incidence of pests in different densities should be recorded.

#### Bhubaneswar

- The trial is to be concluded and the final report is to be submitted to PC Cell, Puttur.
- The trial is to be maintained by proper pruning and training and continued.
- The natural calamities/climatic aberrations resulting in lower yield should be recorded.

#### Hogalagere

- The data needs to be analyzed in split plot design.
- A new trial at Hogalagere needs to be laid out with suitable design and including irrigation.
- Data on mean values are out of the range mentioned in case of flowering duration which should be checked.

#### Jhargram

- Limb pruning is to be continued for four years with due emphasis on management of CSRB after pruning.

#### Madakkathara

- The data on B : C ratio needs to be checked and details need to be submitted to PC Cell, Puttur

**Pilicode**

- The data on mean nut weight and nut yield are to be checked and details need to be submitted to PC Cell, Puttur.

**Vengurla**

- The trial is to be concluded and the final report is to be submitted to PC Cell, Puttur and this trial will continue in other centres.

**Hort 3: Drip Irrigation trial****Bapatla**

- The Centre should submit a proposal for laying out a trial on drip irrigation.

**Hogalagere**

- The trial at Chintamani is to be concluded and a new trial is to be laid out at Hogalagere.

**Jagdapur**

- The Centre should submit a proposal for laying out a trial on drip irrigation in Lamker as decided in the Plenary Session.

**Vengurla**

- The annual nut yield data is to be checked and details need to be submitted to PC Cell, Puttur.
- The trial is to be continued for one more year.

**Vridhachalam**

- The trial is to be continued for one more year.

**Hort. 4: Expt.2 High Density Planting – Observational trial****Bapatla**

- Pruning should be done to maintain sufficient gap between the canopy in the high density planting of 4m x 4m spacing

**Vengurla**

- The trial is to be concluded as there is no plot of 8m x 8m for comparison and the final report is to be submitted to PC Cell, Puttur.

**Hort 6 : Inter cropping in Cashew****Bapatla**

- Proposal for installing sprinkler system in this trial is to be submitted to PC Cell, Puttur.

**Madakkathara**

- Scientific names for the intercrops cultivated should be mentioned.

#### **Paria**

- The trial will continue. Influence of nutrient uptake by okra on the main crop is to be confirmed.

#### **Vengurla**

- Nut yield is to be recorded on plot-wise basis for each intercrop.

#### **Vridhachalam**

- If cashew plants are in pre bearing stage, the yield from other cashew plots should not be reported.
- A plot having cashew alone should also be included.

#### **Darisai**

- The trial is to be continued and details of ground coverage should be re-checked as it has been indicated as >100%.

#### **Kanabargi**

- The estimated yield should be calculated only for cropped area.
- The trial is to be continued.

### **Hort 7: Organic Management of Cashew**

- The isolate of *Beauveria bassiana* specific to TMB available with IIHR, Bengaluru may be procured and evaluated for its efficacy in managing TMB in the trial on organic management of cashew, wherever the trial is been laid out.

#### **Darisai**

- Data on ground canopy area is to be checked.

### **Hort 8 : Spacing cum fertilizer trial**

#### **Kanabargi**

- The trial is to be continued.

### **Hort 10: Varietal screening of Cashew apple for preparation of RTS and Jam**

#### **Bapatla**

- Scientist from Bapatla Centre may visit Madakkathara Centre for guidance on storage of RTS & Jam.

#### **Bhubaneswar**

- The trial is to be discontinued as there is no Technical manpower available at the centre

#### **Paria**

- The data and photographs pertaining to the trial are to be presented in the next AGM.
- The trial is to be continued at Jadalpur, Jhargram, Hogalagere, Kanabargi, Pilicode, Vengurla, Vridhachalam.

**Programmes allotted to different AICRP Cashew centers  
for the next year – 2014-15**

Programmes		Centres
Hort.1.	Nutrient management for yield maximization in cashew.	Bhubhaneswar, Madakkathara and Paria
Hort.2.	Fertilizer application in high density cashew plantations	Bapatla, Bhubhaneswar, Hogalagere, Jhargram, Madakkathara and Pilicode.
Hort.3.	Drip irrigation trials	Bapatla, Hogalagere, Lamker, Vengurla and Vridhachalam.
Hort.4.	High density planting - observational trials	Bapatla, Jhargram, Lamker, Madakkathara and Vridhachalam.
Hort.6.	Intercropping in cashew	Bapatla, Bhubhaneswar, Darisai, Jhargram, Madakkathara, Paria, Vengurla, Vridhachalam and Kanabargi.
Hort.7.	Organic management of cashew	Bapatla, Bhubhaneswar, Hogalagere, Darisai, Jhargram, Lamker, Madakkathara, Vengurla, Vridhachalam, Kanabargi and Tura.
Hort.8.	Spacing cum Fertilizer Trial	Darisai, Paria, Kanabargi and Tura.
Hort.9.	Evaluation of production potential of newly developed variety Jhargram -2 at different spacings.	Jhargram, Darisai and Paria
Hort.10.	Varietal screening of cashew apple for preparation of RTS and Jam	Bapatla, Hogalagere, Jhargram, Lamker, Madakkathara, Paria, Pilicode, Vengurla, Vridhachalam, Kanabargi, Tura and Goa.

## TECHNICAL SESSION III : CROP PROTECTION

Chairman	:	Dr. V. Ambethgar, Professor (Ento.), HCRIW, TNAU
Co-Chairman	:	Dr. P. S. Bhat, Principal Scientist (Ento.), DCR, Puttur
Rapporteurs	:	1. Dr. N. Aswathanarayana Reddy, HREC, Hogalagere 2. Dr. Rajendra B. Patel, Paria, NAU, Gujarat

### Ent - 1: Chemical control of pest complex in cashew

#### Expt. 3: Evaluation of insecticides for the control of TMB & other insect pests.

- KNO<sub>3</sub> may be evaluated as foliar sprays (0.1%) to mitigate the TMB infestation in all Centres wherever the trial is been conducted.

#### Bapatla

- The sample size needs to be maintained at 52 shoots, while recording data on pest incidence.

#### Madakkathara

- Spider fauna encountered in cashew plantations needs to be identified and documented. The publication on spider fauna brought out by DCR may be referred.

#### Paria

- Only the insecticides approved during the AGM need to be evaluated. In case any addition / deviation is felt necessary, prior permission may be obtained from PC (Cashew) before implementation.
- The benefit cost (B:C) ratio for Acetamiprid treatment which is effective need to be worked out.

### Ent 2: Control of cashew stem and root borer

#### Expt. 2 : Curative control trial

- The insecticides whose usage is restricted or availability is limited, viz., carbaryl, monocrotophos and lindane should be excluded from the trials in all Centres.
- The possibility of using *Anacardium excelsa* (a wild cashew species supposed to have hard bark) as rootstock may be explored at DCR, Puttur in consultation with NBPGR.

#### Madakkathara

- The treatments should be given sequentially, so as to maintain uniform number of trees for each treatment.

**Ent.3: Influence of biotic and abiotic factors on the incidence of pest complex of cashew,**

- In the studies on influence of biotic and abiotic factors, provide the data of correlation factors at least for two previous years for drawing valid conclusion.

**Ent. 4: Screening of germplasm to locate tolerant/resistant types of major pests of the region.**

- Cashew varieties /accessions if observed to be tolerant / resistant to infestation by any pest need to be marked and monitored continuously for 3-4 years for its yielding ability and consistency in tolerance for pest attack.
- It is necessary to identify the “indicator cashew plants” in the orchards and monitor the occurrence of TMB and spot application of insecticides may be taken up.

**Programmes allotted to different AICRP Cashew centers for the next year – 2015-16**

Programmes		Centres
Ent.1. Chemical Control of pest complex in cashew.		
Expt 3. Evaluation of insecticides for the control of TMB and other insect pests		Bapatla, Bhubhaneswar, Hogalagere, Darisai, Jhargram, Kanabargi, Lamker, Madakkathara, Paria, Vengurla and Vridhachalam.
Ent. 2. Control of Cashew Stem and Root Borers		
Expt. 2. Curative trials		Bapatla, Bhubhaneswar, Hogalagere, Jhargram, Lamker, Madakkathara, Vengurla and Vridhachalam.
Ent. 3.	Influence of biotic and abiotic factors on the incidence of pest complex of cashew	Bapatla, Bhubhaneswar, Hogalagere, Darisai, Jagdalpur, Jhargram, Madakkathara, Paria, Vengurla, Vridhachalam and Kanabargi.
Ent. 4.	Screening of germplasm to locate tolerant / resistant types for major pests of the region	Bapatla, Bhubhaneswar, Hogalagere, Jagdalpur, Jhargram, Madakkathara, Vengurla and Vridhachalam.

**TECHNICAL SESSION – IV : INTERACTION BETWEEN DEVELOPMENT DEPARTMENTS & RESEARCH CENTRES**

Chairman	: Dr. N.K. Krishnakumar, DDG (H.S.), ICAR, New Delhi.
Co-Chairman	: Dr. P.L. Saroj, Director, DCR, Puttur.
Rapporteurs	: 1. Dr. Meera Manjusha, RARS, Pilicode 2. Dr. M.S. Paikra, Horticulturist, Jagdalpur

Interaction section started with the self-introduction of the participants. The Hon'ble DDG in his introductory remarks mentioned that, cashew being a high value crop, marginal improvements could lead to remarkable changes in the returns. He sought the feedback about cashew cultivation from progressive farmers.

Sri. Kantha Rao, a progressive farmer expressed his concerns about poor plant survival and CSRB attack in the sandy soils. He also expressed lack of awareness about pest management in this area. He mentioned that the yields are not as claimed in the publications. It was clarified that due to sandy soil conditions, split application of inorganic manures should be done.

Sri. Vigneswara, AWARD, Paderu highlighted their efforts with tribals towards organic farming in cashew through which they could improve per capita income from 6000 to 10000.

Sri. Ramana Reddy, another progressive farmer from Gopalapuram, West Godavari, elaborated about his association with cashew. Though adjoining farmers shifted to tobacco and Eucalyptus, he continued with cashew and later neighbouring farmers also adopted cashew due to which they are getting good returns.

Sri. Chandra Reddy, Training Manager, NABARD, Chirala demanded the subsidy to be increased from 29% to 50 % and to extent that to even to small farmers. He also sought active participation and role of NGOs in outreach programmes about cashew.

Sri. Elia, a progressive farmer opined that much of knowledge generated in field of cashew is not reaching the farmers at the grass root level. Also he sought clarification about processing of cashew apples. He also expressed his concerns about non access to market intelligence of cashew. The DDG (Hort. Sci.) mentioned that the scientists of Bapatla Centre should interact with farmers in major cashew growing tracts and monitor the TMB and CSRB attack and report to PC Cell.

The Horticultural Officer from, Department of Horticulture spoke about the schemes for rejuvenation of cashew being implemented by them.

DDG also directed CRS Bapatla to enhance availability of planting material to 1.0 lakh grafts either by them by transferring technology to private nurseries or farmers and asked the state department of Horticulture to lift it or make it reach the farmers.

DDG said that a detailed analysis of present cashew scenario from production, processing to marketing needs to be conducted. The status report on cashew has to be brought out by each centre in their respective states which should be updated every year.

He also directed the PC to facilitate the farmers to visit DCR, Puttur to address the concerns of the farmers, through utilization of HRD funds. Prof. P.L. Saroj expressed his concern about lack of availability of quality and true-to-type scion materials with private nursery men or farmers and about registration of nurseries. To alleviate poor survival of the cashew grafts planted in sandy soil, Prof. P.L. Saroj recommended proper pit size of 1 cubic feet, filling the base with soil rich with clay to prevent fast infiltration of water from the root zone followed by addition of FYM. He also informed the audience that Madakkathara centre has developed the technology for cashew apple utilization.

Hon'ble DDG directed 4-5 centers having infrastructures to concentrate on post harvest losses in cashew with prevailing variety in the region may take up such work. He also said that, Madhya Pradesh, NE states, Telangana and Andamans to be included in this AICRP through redeployment of sanctioned post from other centers.

Prof. P.L. Saroj, sought increase in contingency support for establishing cashew apple processing faculty at the centers. DDG informed the group that DDG (Engg.) will visit DCR within 15 -20 days and taking his suggestion, further action will be decided.

DDG has directed the group within three years to identify the duplicates in germplasm and to maintain the germplasm in a maximum of two locations to avoid over utilization of land resources. It was informed that henceforth in all the publications from AICRP Centres, to acknowledge AICRP in the publications made, failing which the financial support will be curtailed.

## TECHNICAL SESSION – V : PLENARY SESSION

Chairman	: Dr. N.K. Krishnakumar, DDG (H.S.), ICAR, New Delhi
Co-Chairman	: Dr. P.L. Saroj, Director, DCR, Puttur
Special Guest	: Dr. B.M.C. Reddy, VC, Dr. YSHRU
Rapporteurs	: 1. Dr. Meera Manjusha, RARS, Pilicode 2. Dr. M.S. Paikra, Horticulturist, Jagdalpur

This session was chaired by Dr. N.K. Krishnakumar, Hon'ble DDG (Hort.), ICAR and the rapporteurs presented the decisions taken during individual technical sessions. The DDG mentioned that the decisions should be recorded explicitly so as to provide clear indication of the activity. He also expressed that statistical analysis of data and detailed conclusions of each trial should be presented.

It was suggested to look into possibility of area expansion in Bundelkhand and Chitrakoot belt of Uttar Pradesh for suitability to cashew cultivation. Cryopreservation of pollen/ scions of different varieties can be taken up in collaboration with IIHR. It was mentioned that release of varieties from AICRP Cashew Centres without informing Project Coordinator (Cashew) will be viewed seriously and a communication in this regard may be sent to the University sponsoring AICRP-Cashew. It was also indicated that publications wherein AICRP is not acknowledged will lead to proportional reduction in funds. Dr. Jalikop, Former Principal Scientist, IIHR may be consulted regarding the hybrids developed at different centres. It was suggested to take up video recording full Plenary Session to document the decision taken in the AGM.

The occurrence of aflotoxins in cashew kernels obtained from market samples and farm gate samples need to be tested at TNAU and KAU. The ICAR-DCR should communicate regarding rectification of certain fundamental faults in the package of practices published by different Universities.

The meeting ended with a formal vote of thanks by Dr. TN Raviprasad, Prin. Sci. (Agrl. Ento.) and Scientist-in-charge (PC Cell).