Proceedings of the Second Consortium Advisory Committee (CAC) for the Sub-Project "Research into Development of Decision Support Systems for Management of Insect Pests of Major Rice and Cotton Based Cropping Systems" (C2046) under NAIP Component 4 held on 8th October 2009 at NBAII, Bangalore

The second CAC meeting of the sub-project was held at NBAII, Bangalore jointly along with the CACs of two other sub-projects under the theme of IPM under Component 4. The following CAC members of the sub-project attended the meeting:

1	Dr T.M. Manjunath	Chairman
2	Dr S. Lingappa	Member
3	Dr N.H. Rao	Member
4	Dr A. Bandyopadhyay, National Coordinator, Component 4, PIU-NAIP	Member
5	Dr G.G.S.N. Rao, Director i/c, CRIDA	Member
6	Dr Y.G. Prasad, CPI, CRIDA	Member Secretary

The following project scientists from Consortium partners attended the meeting and presented the progress of work:

1. Dr Gururaj Katti, CCPI, DRR, Hyderabad
2. Dr V.S. Nagrare, CCPI, CICR, Nagpur
3. Sujay Dutta, CCPI, SAC, Ahmedabad
4. Dr M. Prabhakar, Co-PI, CRIDA, Hyderabad
5. Dr B.M.K. Raju, Co-PI, CRIDA, Hyderabad

The main agenda included review of work progress at each of the consortium partners and discussion on work plan for next 6 months, administrative and financial issues. Dr Y.G. Prasad, CPI presented the Action taken report on the recommendations of the first CAC meeting followed by a presentation on the overall progress of the project so far. Dr G. Katti, Dr V.S. Nagrare, Sujay Dutta and Dr M. Prabhakar presented the progress at respective centres and also the work plan for next 6 months. The major observations and recommendations of CAC are as follows:

1. Technical

i. Four species of mealybugs are being reported on cotton from the sub-project. The committee recommended that authentic taxonomic identification of the mealybug species is essential. All the consortium partners for cotton will submit specimens of mealybugs to Dr V.V. Ramamurthy, Division of Entomology, IARI for their authentic identification. Dr M. Prabhakar, Dr V.S. Nagrare, Dr B. Dharajyothi and Dr Rishi Kumar will attend a one week training program on identification of mealybugs at the Taxonomy laboratory, Division of Entomology, IARI, New Delhi (Action: CPI & CCPI, CICR, Nagpur)

ii. Similarly three species of mirids, several parasitoids and predators reported may also be got identified by taxonomist. Several unidentified weed hosts are found to serve as alternate hosts for mealybug species in different cotton based cropping systems. These weed species may also be properly identified with the help of botanists (Action: CPI & CCPI-CICR, Nagpur)

iii. While investigating mealybug incidence in relation to cotton based cropping systems, emphasis may be laid on quantifying the incidence on plant species in crop fallows, uncultivated fallows and other adjoining crops along with the incidence on the main crop and also relate to the cultivation history of the field, soil type, input use (fertilizer, pesticide and irrigation water) (Action: CPI and CCPI-CICR, Nagpur)

iv. Year round weather data of temperature and humidity may be collected for developing relationships with pest incidence. Analysis of pest incidence data vis-à-vis weather data may be taken up immediately without waiting till the end of the season as this would facilitate more appropriate and intensive data collection during the season itself. Past pest-weather data available at the centre should be submitted to the lead centre for adding to the database (Action: All CCPIs)

v. While recording the alternate hosts for target pests, ascertain whether it is a true alternate host or infested by chance and also quantify the extent of parasitisation of the pest stages on alternate hosts throughout the year by focusing on key alternate hosts in the area (Action: All CCPIs)

vi. More emphasis needs to be given for cropping system based studies in the work on rice pests. Studies similar to the cotton based cropping systems need to be taken up for uniformity of approach in the sub-project (Action: CCPI-DRR, Hyderabad)

vii. Presentation of progress by CCPI on rice based cropping systems needs improvement clearly bringing out the activities taken up during the half year and since inception with supporting data. Compiled report for all the rice centres in the prescribed format may be prepared by CCPI, DRR at the time of half-yearly and annual progress report submission (Action: CCPI-DRR, Hyderabad)

viii. The committee took note of the very low incidence of rice leaf folder being reported at Coimbatore centre under the rice based cropping systems for rabi 2008-09 and kharif 2009 contrary to the expectation that this is an endemic area for leaf folder. The CCPI also felt that the incidence reported is very low for both the seasons. In view of the changed scenario, it was felt that rice leaf folder is no more a major pest in that area and it was decided to discontinue the Coimbatore associate centre for rice (Action: CCPI-DRR, Hyderabad)

ix. As field experiments are being laid out at multiple locations, it is possible to make generalizations across locations as well depending on the uniformity/standardization of cropping system variables being investigated vis-à-vis pest incidence. This approach is likely to lead to a DSS by building on the integrated work initiated on data collection framework, population dynamics, insect phenology, spatial analysis through RS and GIS (Action: All CCPIs)

x. Caution may be exercised in the work on extrapolation of pest model outputs using spatially derived meteorological variables and crop vegetation indices as relationships are being attempted with scanty data. Weekly count data on rice BPH and damage assessment along with crop information from 25 well distributed locations in the West Godavari district may be attempted during the ensuing rabi season. This data may be analyzed along with RS based indices (NDWI, TVDI, NVDI etc.) and weather parameters (both spatially derived and IMD data). Identification of crop stage and assessment of crop damage will lead to better visualization of BPH occurrence and its spatial spread by using RS and GIS approaches (CPI, CCPI-DRR, Hyderabad and CCPI, SAC, Ahmedabad)

xi. The committee appreciated the multi-directional efforts being made by the consortium partners. However, it felt that the work on pest modeling and decision support systems is highly complex. Reacting on the CPI's plea for capacity building of the partners through a well planned international training programme on development of pest forewarning models and decision support systems, the Committee strongly felt that such an opportunity be provided to all the CCPIs working in the sub project as a group. Dr N.H. Rao, CAC member of the sub-project remarked that International training slots are available under the L&CB sub-project in operation at NAARM. The CAC felt that this group would greatly benefit if this opportunity is made available by the competent authority and strongly recommended the proposal for international training of 5 project scientists: four CCPIs of DRR, CICR, SAC, NCIPM; and one CPI, CRIDA (Action: NC, C4)

2. Administrative and Financial

A. Funds disbursement by DRR to its associate centers:

With respect to the fund disbursement by DRR, Hyderabad to its associate centres, the committee was informed that the funds meant for its 4 associate AICRP centres (Maruteru, Ludhiana, Cuttack, Coimbatore) and one centre at BCKV, Mohanpur have been released to the respective Comptrollers of the University based on clarification by Director (Finance), PIU, NAIP. This mechanism stands ratified. DRR needs to ensure timely submission of quarterly expenditure statements and utilization certificates by its associate network centres in a manner suitable for auditing its expenditure by NAIP audit. The quarterly, half-yearly and Annual SoEs submitted by DRR should clearly reflect the expenditure at its centres (Action: CCPI-DRR, Hyderabad)

B. Reallocation within Head (NRC funds)

a) Three environmental test chambers with a budget of Rs 9.0 lakhs (Rs 3.0 lakhs each) have been sanctioned for CRIDA, Hyderabad. The lowest quotation obtained is for Rs 6.0 lakhs mainly due to cost escalation + taxes. In view of this, CAC accorded approval for the proposal to procure one unit instead of the sanctioned three units for CRIDA, Hyderabad within the sanctioned budget of Rs 9.0 lakhs (Action: CPI)

b) The CAC considered and recommended the proposal for procurement of accessories to the existing automatic weather stations (recently procured from other sources of funding) in place of the sanctioned three weather stations for CICR, Nagpur within the sanctioned budget of Rs 3.0 lakhs for weather station (Action: CCPI, Nagpur) (specific proposal in Annexure 1)

c) The operational funds meant for Coimbatore centre (Rs 1.07 lakhs) is reallocated for meeting the need for more intensive data collection at 25 well distributed points in West Godavari district by Maruteru centre. This centre raised a demand for Rs 1.94 lakhs for 2009-10 (enclosed) for vehicle hiring, daily labour charges and hiked wages of skilled workers on contract (Rs 5508/month). However, an amount of Rs 1.07 lakhs is already provisioned and hence the difference amount of Rs 0.87 lakhs under the same head is approved (Action: CCPI-DRR, Hyderabad)

C. Proposals considered and recommended for additional funds:

d) Request for additional funds of Rs under TA has come from CICR for its centres (proposal in Annexure 2) and operational expenses (Annexure 3A) with regard to enhanced rates for hiring of seasonal workers and additional workers proposed at the 3 centres in view of the year round work load in field surveys and lab work

e) Under operational head for CRIDA, Hyderabad additional funds for hiring charges for skilled workers are requested to meet the shortfall in funds in view of prevailing enhanced wages (Specific proposal in Annexure 3B)

f) One RA out of three allocated to CRIDA has been deployed at SAC, Ahmedabad. The Consortium lead centre is carrying out the work with two RAs –Entomology and Computers. CAC considered the proposal of one RA (Statistics) as necessary at the Consortium lead centre for assistance in data analysis for development of pest-weather relationships and pest forewarning models (Specific proposal in Annexure 3C)

3. General

i. Procurement of equipment may be expedited. Unspent funds under equipment will not be revalidated for next year (Action: CPI & CCPIs of CICR and DRR)

ii. The CIC members should meet prior to the CAC meeting and finalize their presentations on the work progress

(T.M. MANJUNATH)
Chairman, CAC

Annexure 1

Reallocation within Head (NRC funds)

Proposal for procuring sensors for existing weather stations in place of sanctioned Weather Stations 3 numbers at a cost of Rs 3.0 lakhs by Consortium partner CICR, Nagpur

Sr. No.	Location	Name of sensor to be procured as accessory to existing automatic weather station	Cost including installation and VAT (Rs.)
1.	Nagpur	Net Radiometer	52000
		Charges for modification of the data logger	30000
		VAT 12.5%	6500
		Freight and insurance charges & Installation charges	10000
		Total destination price	**98500**
2.	Coimbatore	Net Radiometer	52000
		Charges for modification of the data logger	30000
		VAT 12.5%	6500
		Freight and insurance charges & Installation charges	10000
		Total destination price	**98500**
3.	Sirsa	1. Air temperature and relative humidity	74214
		2. Leaf wetness temperature	7894
		3. Soil temperature	6263
		Total ex-godown NOIDA	88371
		VAT CST 4.4%	3977
		Freight and insurance charges	884
		Installation charges	4000
		Total destination price	**97232**

Justification : CICR procured and installed Automated Weather Station at all field locations of Nagpur, Sirsa and Coibatore under Plan funds. Hence it is proposed that additional sensors may be procured for the existing weather stations within the sanctioned amount of Rs. 3.0 lakhs.

(YG Prasad)
CPI & Member Secretary, CAC

(T.M. MANJUNATH)
CAC, Chairman

Annexure 2

Additional funds proposals recommended for consortium partners under recurring contingency head

A. Proposal for additional funds under TA Head

Sanctioned and additional TA proposed for CICR-Nagpur and its two centres (Sirsa and Coimbatore)

(Rs. In lakhs)

Sl. No.	Items of Expenditure	2009-10	2010-11	2011-12	Total
	A. Recurring Cont. (TA)				
1	TA sanctioned	0.62	0.63	0.63	
2	**TA Additional Proposed**	**0.60**	**2.17**	**2.17**	**4.94**

Justification:
Following is the break-up of TA funds sanctioned and additional proposed. The additional funds are required to meet the escalation in hiring costs for year round cropping system surveys and travel requirements to attend CIC and CAC meetings of project scientists

(Rs.In Lakh)

S. No.	Particulars	Nagpur			Coimbatore			Sirsa		
1	Financial Years	2009-10	2010-11	2011-12	2009-10	2010-11	2011-12	2009-10	2010-11	2011-12
2	Allocation of sanctioned amount for each centre	0.22	0.23	0.23	0.25	0.25	0.25	0.15	0.15	0.15
3	Additional Requirement	0.20	0.87	0.87	0.20	0.75	0.75	0.20	0.55	0.55

(YG Prasad)
CPI & Member Secretary, CAC

(T.M. MANJUNATH)
CAC, Chairman

Annexure 3

Proposal for additional funds under operational expenses for Consortium partners

3A. Proposal for additional funds for engaging skilled workers – CICR, Nagpur and its two centres (Sirsa And Coimbatore)

(Rs in lakhs)

S.No	Particulars	Number of skilled workers	Rate/ month	2009-10	2010-11	2011-12	Total
i	**Sanctioned**						
	Hiring of seasonal workers for 10 months/yr	8	Rs 4000	3.20	3.20	3.20	
ii	Actual expenditure being incurred	8	Rs 5505	4.40	4.40	4.40	
iii	Difference amount to be funded			1.20	1.20	1.20	
iv	Additional workers proposed (1 at Nagpur, 2 each at Sirsa and Coimbatore)	5	Rs 5505	0	2.75	2.75	
v	Total additional funds proposed			**1.20**	**3.95**	**3.95**	**9.1**

Justification: The existing budget is insufficient to engage required skilled helper/seasonal workers in view of the minimum wages prevailing (Rs 5505 as against the rate at the time of sanctioning which is Rs 4000/month). Considering the workload of observation under field conditions, the additional number of skilled helpers has been proposed at different locations of CICR. Hence,

(YG Prasad)
CPI & Member Secretary, CAC

(T.M. MANJUNATH)
CAC, Chairman

3B. Proposal for additional funds for engaging skilled workers under operational expenses – CRIDA, Hyderabad

(Rs in lakhs)

S.No	Particulars	Number of skilled workers	Rate/ month	2009-10	2010-11	2011-12	Total
i	**Sanctioned**						
	Hiring of seasonal workers for 10 months/yr	4	Rs 4000	1.60	1.60	1.60	
ii	Actual expenditure being incurred	8	Rs 5917	2.37	2.37	2.37	
iii	Difference amount proposed for additional funding			**0.77**	**0.77**	**0.77**	**2.31**

Justification: The existing budget is insufficient to engage required skilled helper/seasonal workers in view of the prevailing minimum wages (Rs 5917/month) which are higher than the rate (Rs 4000/month) at which the budget was sanctioned

3C. Additional funds request under contractual services head for CRIDA, Hyderabad

Sl. No.	Items of Expenditure	Number of RAs	2010-11	2011-12	Total
	A. Recurring Cont.				
i	Contractual services* – sanctioned	3	8.82	8.82	
ii	Contractual services* – additional funds proposed	4	2.81	2.81	**5.62**

*RA/SRF plus Office assistant

Justification:
One RA out of three allocated to CRIDA has been deployed at SAC, Ahmedabad. The Consortium lead centre is carrying out the work with two RAs –Entomology and Computers. One RA (Statistics) is necessary at the Consortium lead centre for assistance in data analysis for development of pest-weather relationships and pest forewarning models.

(YG Prasad)
CPI & Member Secretary, CAC

(T.M. MANJUNATH)
CAC, Chairman

International Training proposal for CPI and CCPIs

Justification:

The CAC appreciated the multi-directional efforts being made by the consortium partners. The committee felt that the work on pest modeling and decision support systems is highly complex and requires capacity building of the partners through a well planned international training programme on development of pest forewarning models and decision support systems. The Committee strongly felt that such an opportunity be provided to all the CCPIs working in the sub project as a group. Dr N.H. Rao, CAC member of the sub-project remarked that International training slots are available under the L&CB sub-project in operation at NAARM. The CAC felt that this group would greatly benefit if this opportunity is made available by the competent authority and strongly recommended the proposal for international training of 5 project scientists: four CCPIs of DRR, CICR, SAC, NCIPM; and one CPI, CRIDA. Retrieval of satellite based agro-meteorological parameters for development of pest prediction model is an advanced and new field for which there is no expertise available within the country and hence capacity building of project scientist from SAC is included.

Name of CPI/CCPI	Name of Institute Proposed for Training	Area of Work	Name of the Scientist who is specialized in the proposed area of work	Training Period	Approximate Cost
Y.G. Prasad, CPI, CRIDA, Hyderabad	School of Biological Sciences, The University of Queensland, Brisbane, Qld 4072, Australia.	Advances in insect pest modeling approaches and decision support systems	M. P. Zalucki, (m.zalucki@uq.edu.au) Phone:+336 51747	3 months	Rs 6.0 lakhs
Dr VS Nagrare, CCPI, CICR-Nagpur	School of Biological Sciences, The University of Queensland, Brisbane, Qld 4072, Australia.	Insect pest modeling approaches for cotton based cropping systems	M. P. Zalucki	3 months	Rs 6.0 lakhs
Dr Gururaj Katti, CCPI, DRR, Hyderabad	School of Biological Sciences, The University of Queensland, Brisbane, Qld 4072, Australia	Insect pest modeling approaches for cereal based cropping systems	M. P. Zalucki	3 months	Rs 6.0 lakhs
Dr S. Vennila, CCPI, NCIPM, New Delhi	School of Biological Sciences, The University of Queensland, Brisbane, Qld 4072, Australia		M. P. Zalucki	3 months	Rs 6.0 lakhs
Sujay Dutta, SAC, Ahmedabad	Dept. of Entomology, College of Agricultural & life Sciences, University of Wisconsin Madison USA Fax: 608-262-332	Retrieval of satellite based agro-meteorological parameters for prediction of pest incidence	Prof. David B. Hogg	3 months	Rs 6.0 lakhs

(YG Prasad)
CPI & Member Secretary, CAC

(T.M. MANJUNATH)
CAC, Chairman

ACTION TAKEN REPORT for 1st CAC MEETING HELD ON 29.11.08 at CRIDA, Hyderabad

Sl.No	Suggestions	Action Taken
1.	Prepare sampling plans with proper statistical basis for cropping-system-based observations and obtain statistical opinion before proceeding with data collection for cropping systems	Cropping systems based sampling plans, data collection formats and data reporting formats amenable for statistical analysis have been prepared and shared with all project partners
2.	In addition to collecting field survey data on Bt-cotton hybrids, try as best as possible to collect similar data on non-Bt cotton hybrids and also on cotton varieties, if available, in the target site	Coverage of Bt cotton is now very widespread. Data on non-Bt cotton is being generated at Warangal site
3.	Two groups have been constituted to prepare conceptual models as early as possible for at least one pest each in rice and cotton depicting how meteorological data and biological (life table) data can be utilized to predict pest outbreaks/populations. These would serve as templates so that the hypothetical data can be replaced with actual data. The partners should meet at the earliest and finalize the conceptual models.	Conceptual frameworks were prepared for three target pests in cotton based and three pests in rice based cropping systems. Template with hypothetical biological data was prepared for rice stem borer and template for cotton mealybug has been prepared as advised. All the project scientists from all the centres met and discussed the conceptual models on 6th March 2009 in a one day workshop that was presided over by Chairman, CAC at CRIDA, Hyderabad
4.	The membership of Consortium Monitoring Unit (CMU) may be got approved by the Chairman, CAC	Complied. CMU constituted and approved
5.	The Mode of operation for utilizing the funds allotted to the consortium partner DRR, Hyderabad and also for carrying out the approved activities at its four AICRP centres and one centre at BCKV was discussed at length. Various options were considered. The final model found to be workable by the CAC was that the CCPI will provide a temporary (quarterly) advance to the centres to meet the expenditure for approved activities in accordance with the NAIP guidelines. The certificate of expenditure along with bills will be sent by the centres to DRR, Hyderabad which will be responsible for submission of SoE and Audit	CCPI, DRR informed in the 2nd Implementation Committee meeting that the funds meant for its 4 associate AICRP centres and one centre at BCKV, Mohanpur have been released to the respective Comptrollers of the University based on the clarification on the issue by Director, Finance during the training programme on procurement guidelines during 29-30 January, 2009

	Utilization Certificate. The PIU-NAIP may examine this suggested model.	held at NAARM, Hyderabad. DRR needs to ensure timely submission of expenditure statements and utilization certificates by its associate network centres in a manner suitable for auditing its expenditure by NAIP audit. This mechanism may be ratified in the next CAC.
6.	Procurement of equipment may be expedited. Cost escalation on account of increase in exchange rate will be sanctioned by PIU on submission of specific proposals with appropriate justification.	Procurement plan was prepared by all project partners. ICB proposals for Hyperspectral radiometer, test chambers and plant canopy analyzer are pending with Under Secretary (Procurement), NAIP for clearance. Proposal for procurement for software by direct contracting method is also under consideration by US, NAIP/Procurement consultant
7.	The content of the NAIP sub-project to be displayed on the web page. IPR issue, if any, with the outsourcing agency should be examined and an MOU signed accordingly.	Sub-project website was developed in house and hosted for access through internet. Now a proposal is under process for improving the web page layout through outsourcing.
8.	The agenda of a CAC meeting should be got approved by the Chairman and circulated among the members at least seven days in advance of the meeting. Before every CAC meeting, the progress made so far and the plan of work for the next six months should be circulated among the CAC members at least 10 days in advance of the date of the CAC meeting.	Being complied.

Work plan for the second half of 2009-10 (Sep to March 2010)- NAIP C4/C2046

CRIDA

- Submission of mealybug samples, parasitoids and predators of Warangal location for authentic identification by taxonomist and weeds/alternate hosts by botanist
- Digitize field boundaries of about100 fields (using IRS P-6, CARTOSAT data)
- Spatial and temporal distribution of pests *vis- -a-vis* soil, crops and cropping systems in Warangal (maps)
- Grid-wise sampling of pest data during season and on alternate hosts during off season
- Web enabled data entry and analysis
- Developmental threshold temperature studies for cotton mealybug at 18, 36 and 40 ^{o}C
- Development of models using lab and field data
- ITK compilation
- Procurement of hyper spectral radiometer and Dymex SW
- Multi-spectral data for crop damage assessment for rice pests (leaf folder and plant hoppers) in collaboration with DRR

DRR and its associate centres

- Collection and submission of historical data for respective cropping system locations for target pests by all the associate centres, analysis of data for pest occurrence windows (initiation and peak occurrence) in different years, identification of epidemic and non-epidemic years
- Analysis of past pest and weather data sets for developing relationships
- Effect of temperature and relative humidity on life stage of selected insect pests (Leaf folder and White Backed Plant Hopper) at DRR, Hyderabad
- Cropping system based field studies on population dynamics of target pests(yellow stem borer, leaf folder, plant hoppers) at Maruteru(Andhra Pradesh), Ludhiana (Punjab), Cuttack (Orissa) and Mohanpur (West Bengal) – trap catches, off-season hosts, parasitisation and predation, survival and carry over in crop residue
- Multi-spectral data for crop damage assessment for rice pests (leaf folder and plant hoppers) in collaboration with CRIDA
- Further refining of the hypothetical models of stem borer, leaf folder and plant hoppers after analysis of historical data sets as well as existing information on pest bioecology.Ground truth collection of plant hopper field incidence at 25 well distributed sites in West Godavari district, during rabi 2009-10.

CICR and its associate centres

- Submission of samples of mealybug species, mirid species and alternate hosts for their authentic identification by taxonomist and botanist
- Estimate developmental rates for mealybugs and mirids (Nagpur) and mirids (Coimbatore) at constant temperatures on cotton as well as selected hosts

- Population dynamics and spread pattern of mealybugs and mirids in on-station experiments at Coimbatore
- Cropping system based field studies at Coimbatore for mealybugs and mirids during season (Coimbatore) and off-season (Nagpur, Sirsa)
- Quantification of natural control by parasitoids and predators during season (Coimbatore) and off-season (Nagpur and Coimbatore)
- Investigating sampling strategies for mirids at Coimbatore
- Further refining of the hypothetical models of mealybug (Nagpur and Sirsa), mirid (Nagpur and Coimbatore) and pink bollworm (Warangal) after analysis of historical data sets as well as existing information on pest bio-ecology
- Collection and submission of past data on Bt cotton (2002 onwards) for respective cropping system locations for target pests by all the associate centres, analysis of data for pest occurrence windows (initiation and peak occurrence) in different years, identification of epidemic and non-epidemic years
- Analysis of current and past pest and weather data sets for developing relationships in collaboration with NCIPM

NCIPM

- Population dynamics of cotton and rice pests in different cropping system scenarios & surveys and content development
- Compilation of existing information and data for rice and cotton pests and diseases
- New models for validation

SAC

- Collection of ground truth information for cotton in collaboration with Sirsa centre
- Using optical data for crop stage identification and crop condition assessment for rabi rice in West Godavari district
- Using sounder data derive spatially distributed meteorological data and validation with met observatory data
- RS based spatial analysis of BPH incidence in west Godavari district and cotton pests at Sirsa

Annexure 1

List of Participants

CAC Chairmen

Dr. S. P. Singh	*CAC, Chairman, NBAII project*
Dr. T.M. Manjunath	*CAC, Chairman, CRIDA project*
Dr. V. Muniyappa	*CAC, Chairman, IARI project*

CAC Members

Dr. A. Bandopadhyay	*National Coordinator – Component 4*
Dr. R. J. Rabindra	*Director & CL – NBAII project*
Dr. K. R. Koundal	*Joint Director and CL – IARI Project*
Dr. G. G. S. N. Rao	*Project Coordinator and CL – CRIDA project*
Dr. V. V. Ramamurthy	*Member, CAC*
Prof. I. Dasgupta	*Member, CAC*
Dr. S. Lingappa	*Member CAC*
Dr. N. H. Rao	*Member CAC*

NAIP Component IV (C2046)

CRIDA, Hyderabad

1. Dr. Y. G. Prasad	***CPI, CRIDA***
2. Dr. M. Prabhakar	*CCPI*
3. Dr. Gururaj Katti	*CCPI*
4. Dr. V. S. Nagrare	*CCPI*
5. Dr. B. M. K. Raju	*CCPI*
6. Dr. Sujay Dutta	*CCPI*

NAIP Component IV (C2082)

NBAII, Bangalore

1. Dr. S. K. Jalali	***CPI, NAIP***
2. Dr. J. Poorani	*CCPI, NAIP*
3. Dr. T. Venkatesan	*CCPI, NAIP*
4. Dr. R. Rangeshwaran	*CCPI, NAIP*
5. Dr. K. Srinivasa Murthy	*CCPI, NAIP*
6. Dr. S. Sriram	*CCPI, NAIP*
7. Mr. B. Amarnath	*AAO, NBAII*
8. Mr. A. Srinivasa Murthy	*AFAO, NBAII*
9. Mr. G. Ashok Kumar	*SRF, NAIP*
10. Dr. Mahiba Helen, S	*SRF, NAIP*
11. Mr. N. V. Vajid	*SRF, NAIP*

12. Ms. Roopa, K. P	*SRF, NAIP*
13. Ms. G. Nagalakshmi	*OA, NAIP*
14. Dr. P. L. Tandon	*Subject Expert*
15. Dr. N. S. Rao	*Subject Expert*
16. Dr. B. S. Bhumannavar	*Principal Scientist*
17. Dr. D. Sundararaju	*Principal Scientist*
18. Dr. N. Bakthavatsalam	*Principal Scientist*
19. Dr. Prashanth Mohanraj	*Principal Scientist*

DOR, Hyderabad

20. Dr. R. D. Prasad	*CCPI, NAIP*
21. Dr. V. Dinesh Kumar	*CCPI, NAIP*

CRIDA, Hyderabad

22. Dr. Suseelendra Desai	*CCPI*

VMSRF, Bangalore

23. Dr. Anil Kush	*CCPI, NAIP*
24. Dr. Pooja Ravi Kumar	*Project Scientist*
25. Ms. Ancy Joseph	*SRF, NAIP*

Mysore University

26. Prof. V. A. Vijayan	*CCPI, NAIP*
27. Mr. Vivek Charles	*SRF, NAIP*

NAIP Component IV (C2053)

IARI, New Delhi

1. Dr. Bikash Mandal	***CPI***
2. Dr. V. G. Malathi	*CCPI*
3. Dr. V. K. Baranwal	*CCPI*
4. Dr. K. Anitha	*CCPI*
5. Dr. R. D. V. J. Prasad Rao	*CCPI*