

Strengthening Statistical Computing for NARS

2009 – 2014

RPF III

(PROFORMA FOR SUBMISSION OF FINAL REPORT OF RESEARCH PROJECTS)**Part - I : General Inforamtion****800 Project Code :****8001 Institute Project Code No. : 65/2009****8002 ICAR Project Code No. :****801 Name of the Institute and Division :****8011 Name & Address of the Institute : NAARM, Hyderabad****8012 Name of the Division/Section : Information and Communication Management****8013 Location of the Project : Hyderabad****802 Project Title :****Strengthening Statistical Computing for NARS****803 Priority Area :****8031 Research Approach : Applied Resv./ BasicRes./ Process Dev/ Tech. transfer**
01 02 03 04**804 Specific Area :**

Statistical Computing using SAS

805 Duration of the Project :**8051 Date of Start : April 2009****8052 Date of Completion : March 2014**

806 Total Cost/Expenditure Incurred : 2009-14

(Give reasons for variation, if any, from the original estimated cost)

Rs. in Lakhs

Total budget sanctioned	Fund released (up to closing date)	Fund utilized* (up to closing date)
64.7596	43.89035	47.907

* Balance amount to be reimbursed by PIU-NAIP after 31-03-2014.

807 Executive Summary :

During the project period (2007-2014), 36 36 training programmes which includes orientation programmes, sensitization programmes, refresher courses, FOCARS and training programmes, were organized for scientists of National Agricultural Research System under the project. A total of 1489 scientific personnel were trained in data analysis using SAS. Four macros were created for analyzing Augmented Designs, Split-Split Plot and Split-Factorial Plot designs. The macros are easy to use and produce customized output. Three training resource materials were prepared and distributed during the programmes. Along with IASRI, a statistical computing portal was envisaged and implemented for use in NARS. A web-based automation tool for automating the All-India Coordinated Research Projects (AICRPs) from experimental planning, randomization, data upload, statistical analysis and report generation was created and implemented for All India Coordinated Sorghum Improvement Programme.

808 Key Words:

Data Analysis, SAS, Capacity building, Statistical computing, Instructional material

Part - II Investigator Profile**810 Principal Investigator :**

8101 Name :Dr. M.N. Reddy(CCPI) (upto 22-12-2011)
 8102 Designation : Principal Scientist
 8103 Division/Section :ICM
 8104 Location :NAARM
 8105 Institute Address : NAARM, Hyderabad

811 Co-investigator :

8111 Name : Dr. A.Dhandapani
 (Nodal Officer upto 22-12-2011 and CCPI
 from 23-12-2012)
 8112 Designation : Principal Scientist
 8113 Division/Section : ICM
 8114 Location : Hyderabad
 8115 Institute Address : NAARM, Hyderabad

812 Co-investigator :

8121 Name :Dr. G. P. Reddy
 8122 Designation :HOD, ABM and Principal Scientist
 8123 Division/Section : ABM
 8124 Location : Hyderabad
 8125 Institute Address : NAARM, Hyderabad

813 Co-investigator :

8131 Name :Dr. Ananta Sarkar (upto April 2012)
 8132 Designation :Scientist
 8133 Division/Section :ICM
 8134 Location :NAARM
 8135 Institute Address :NAARM, Hyderabad

814 Co-Investigator :

8141 Name :Dr. R. Sivaramane
 8142 Designation :Senior Scientist
 8143 Division/Section :ABM
 8144 Location :NAARM
 8145 Institute Address :NAARM, Hyderabad

815 Co-Investigator :

8151 Name :Dr. P.D Sreekanth
 8152 Designation :Scientist (Senior Scale)
 8153 Division/Section :ICM
 8154 Location :NAARM
 8155 Institute Address :NAARM, Hyderabad

816 Co-Investigator :

8161 Name :Sh. V. Sumanth Kumar

8162 Designation :Scientist
8163 Division/Section :ESM
8164 Location :NAARM
8165 Institute Address :NAARM, Hyderabad

817 Co-Investigator :

8171 Name :Dr. S. Ravichandran
8172 Designation :Principal Scientist
8173 Division/Section :ICM
8174 Location :NAARM
8175 Institute Address :NAARM, Hyderabad

818 Co-Investigator :

8181 Name :Sh. K.V. Kumar
8182 Designation :Assistant Chief Technical Officer
8183 Division/Section :ICM
8184 Location :NAARM
8185 Institute Address :NAARM, Hyderabad

Part - III : Technical Details

820 Introduction and objectives :

Choosing the correct statistical procedure for a given experiment is based on expertise in statistics and in the subject matter of the experiment. For enhancing the quality of the agricultural research, it is essential that availability of high end statistical packages at the hands researchers should be given top priority. With the availability of only small number of statisticians and with no direct access to statistical software packages, the data analysis takes back seat affecting adversely the quality of agricultural research. It is, therefore, pertinent that high end computing facilities are made available to the scientists of NARS so as to strengthen the computing environment that would help the statisticians to reach the agricultural scientists speedily and to provide these agricultural scientists with statistical support that would help them enhance the quality of agricultural research. This project is a big effort in this direction. The major aim of this initiative is to provide the scientists working in NARS with strong and high end statistical computing facilities and capacity building in the use of general purpose statistical package

8201 Project Objectives :

The objectives of the project would be:

- To strengthen the high end statistical computing environment with appropriate infrastructure development
- To develop training manuals and instructional resources for capacity building
- Capacity building to the NARS scientists, faculty and technical personnel in the statistical computing capabilities

The following were long term objectives;

- To strengthen Statistical Computing
- To organize training programmes in the usage of statistical software package to the scientists and technical personnel of different ICAR Institutes and State Agricultural Universities along with the help and technical support of the vendors.

8202 Background Information and Importance of the Project:

Statistical analysis is an important tool to extract as much information as possible from the

given data. Statistical computing methods enable to answer quantitative biological questions from research data and help plan new experiments in a way that the amount of information generated from each experiment is maximized. Widespread use of computers and specialized high end statistical software packages have helped and greatly improved the ability of researchers to analyze and interpret voluminous data. Developments in computerized statistical analysis have enhanced the ability of researchers to come up with better conclusions. This has helped in improving their statistical, computer-related and networking skills of the researchers. For exploiting and sustaining these developed skills, availability of proper computing and infrastructure facilities to agricultural research in National Agricultural Research System (NARS) is of utmost consequence for improving their skills. The statistical computing support would be useful in improving the quality of agricultural research and make it globally competitive and acceptable by way of publications in International refereed Journals. The present project, therefore, targets at providing technical support on the component of statistical computing by applications of general purpose statistical software package that help in undertaking appropriate, sophisticated and computationally involved statistical analysis of data keeping in mind also the accuracy and precision of analysis. It is expected to create a healthy statistical computing environment for the benefit of the scientists in NARS by way of providing advanced, versatile, and innovative and state-of the art high end statistical packages and enable them to draw meaningful and valid inferences from their research.

821 Project Technical Profile :

8211 Technical Programme :

(Indicate briefly plan of procedure, techniques, instruments and special materials, organisms, special environments, etc.)

- Develop expertise as well as appropriate datasets to explain various statistical analysis using modern statistical computing techniques using SAS
- Organize training programmes as well as sensitization programmes to (i) Researchers (ii) FOCARS on Data analysis and statistical computing

- Create easy to use tools for advanced data analysis
- Develop a prototype information system for All-India Coordinated Research Project

8212 Total Man-months Involvement of Component Project Workers :

Lead Centre: Indian Agricultural Statistics Research Institute, New Delhi	
HUB-8, National Academy of Agricultural Research Management (NAARM)-Hyderabad	
Research Management (CCPI)	
CPI	
1. Dr. M. N. Reddy	5 man months
2. Dr. A. Dhandapani	18 man months
Scientific (CPI, CCPI, others)	
3. Dr. G.P.Reddy	5 man months
4. Dr. Ananta Sarkar	6 man months
5. Dr.N.Sivaramane	3 man months
6. Dr.P.D.Sreekanth	3 man months
7. Sh.V.Sumanth Kumar	2 man months
8. Dr.S.Ravichandran	1 man month
Technical	
9. Sh.K.V.Kumar	10 man months
Contractual	
10. D. Rama Krishna	25th Sept 2009 to 2nd March 2010
11. G. Ramachandra Rao	2nd May 2010 to 14th July 2011
12. A.Krishna Prasad	2 nd Nov 2011 to till to date

822 Final Report on the Project :

8221 Achievements in Terms of Targets Fixed for Each Activity:

1. Media Products Developed/Disseminated

S. No.	CD, Bulletins, Brochures, etc. (Year wise)	No. of Copies	Distribution	Responsible Partner
Brochure				
1	Data Analysis Using SAS – Resource Material CD	500	Research Trainees	NAARM, Hyderabad

2. Capacity Building

S. No.	Training programme organized	Duration (From-To)	No. of Personnel Trained
Workshop-cum-Installation Training			
1.	Orientation cum Installation Training	June 16-17, 2010	30
2.	Orientation cum Installation Training	November 15-16, 2011	35
3.	Workshop-Cum-Installation training of Nodal Officers	June 27, 2012	18
4.	Workshop-Cum-Installation training of Nodal Officers	October 18-19, 2013	22
Total No.of Orientation Programme for Nodal Officers: 4			105
1.	Training Workshop on Data Analysis Using SAS , College of Agricultural , Bapatla	Feb 28-March 2, 2013	40
2.	Training Workshop on Data Analysis using SAS, TANUVAS, Chennai	March 11-13, 2013	27
Total No.of Sensitization Training Programmes:2			67

FOCARS

S.No	Batch No	No of days	No.of Participants
1	90th Foundation Course for Agricultural Research Service (20 Apr to 17 Aug 2010)	02	44
2	91st Foundation Course for Agricultural Research Service (11 May to 7 Sep 2010)	02	38
3	92nd Foundation Course for Agricultural Research Service (01 Sept to 29 Dec 2010)	02	76
4	93rd Foundation Course for Agricultural Research Service (27 Apr to 24 Aug 2011)	02	100
5	94th Foundation Course for Agricultural Research Service (15 Sept to 13 Dec 2011)	02	136
6	95th Foundation Course for Agricultural Research Service (23 Jan to 21 Apr 2012)	02	20
7	96th Foundation Course for Agricultural Research Service (July-Oct, 2012)	02	33

8	97th Foundation Course for Agricultural Research Service (Jan 1st -April 1st, 2013)	02	124
9	98th Foundation Course for Agricultural Research Service (Jul 1st –Sept 30th , 2013)	02	23
10	99th Foundation Course for Agricultural Research Service (Jan 1st -April 1st, 2014)	02	205
Total No.of Programmes : 10			799

Refresher Course on Agricultural Research Management for Senior / Principal Scientists

S.No	Duration	No of days	No.of Participants
1	3-23 November 2011	02	28
2	19 Jan to Feb 8 , 2012	01	30
3	5-18 June, 2012	01	32
4	January 7-19, 2013	01	31
5	July 15-27, 2013	01	45
6	Feb 3-15, 2014	01	45
Total No.of Programmes : 6			211

National Training imparted on Usage of SAS

S. No.	Training programme organized	Duration (From-To)	No. of Personnel Trained
Trainers training			
	SAS: A Comprehensive Overview	June 28 – August 02, 2010	29
Researchers Training			
Year 2010-2011			
1	Data Analysis Using SAS	September 15 – 22, 2010	18
2	Data Analysis Using SAS	November 24 – 30, 2010	26
3	Data Analysis Using SAS	December 13 – 18, 2010	21
4	Data Analysis Using SAS	January 19 – 25, 2011	26
5	Data Analysis Using SAS	March 21 – 26, 2011	16
Year 2011-2012			
6	Data Analysis Using SAS	August 17 – 23, 2011	25
7	Data Analysis Using SAS	December 14-20, 2011	11
8	Data Analysis Using SAS	January 27- February 02, 2012	16

9	Data Analysis Using SAS	February 13-18, 2012 at RARS Tirupati	24
10	Analysis of Experimental Data Using SAS	November 2-8, 2012	13
11	Survey Design and Data Analysis using SAS in Social Sciences	Jan 28 to Feb 6, 2013	19
12	Data Analysis Using SAS at TANUVAS, Chennai	November 25-30, 2013	30
13	Data Analysis Using SAS at TNAU, Coimbatore	December 9-14, 2013	33
Total No.of Programmes :14			307

Tools For Easy Data Analysis

(i) Augmented Designs

During the development of new varieties, the experimenters face problem of not having sufficient seed materials for the test materials to conduct replicated trials. In such cases, Augmented designs are used to evaluate the new test materials against the Control or check varieties. The analysis of data obtained from Augmented designs follow a different procedure unlike the usual randomized block design. To assist the experimenters to analyze the data from Augmented designs, a macro has been developed in SAS and made available. The “Augment” macro can analyze multiple characters from a single experiment done in Augmented design and produce the output in a highly customized report in Rich Text Format (RTF). The features in Augmented macro include ANOVA, treatment means and CV, grand mean etc.

(ii) Split-Split factorial

Split-Split factorial experiments are conducted where the experimental area within a replication have been divided into Main Plot, Sub Plot and Sub-Sub Plot and the treatments are allocated randomly into these separately. The analysis of such design would involve specifying appropriate error terms for main plot, sub-plot and sub-sub plot treatments so that statistically valid comparisons could be made from such experimental data. To facilitate analysis of such experimental data, a SAS Macro, “Split-Split” has been developed. The macro produces output of ANOVA table, related statistics and two-way, three-way mean tables along with group letters to show which treatment means are at par and which are not.

(iii) Split-Factorial

A split factorial design is nothing but a usual split plot design but the sub-plot treatment is in factorial structure. The analysis of split factorial experiment involve dividing the sub-plot treatment effect into sub-plot main effects, sub-plot interaction effects and interaction between main plot and the sub-plot treatment effects besides specifying correct error terms to compute F-ratio. A “Split-Factorial” macro has been developed in SAS and the output produced by the macro include ANOVA tables, mean tables, CD values etc.

Analysis of Factorial Experiments with one extra treatment

In some experiments, the treatments included are factorial structure with one extra treatment (control). For example, if the experimenter is interested to compare 3 sources of a fertilizer at 3 different levels. The number of treatment combinations are 9 (3 x 3) and it is also usually of interest to include a control treatment. The resultant treatment structure is no longer a factorial structure, as there is one extra treatment. To analyze such experiments, many experimenters, simply ignore the control treatment and analyze it as a factorial experiment or ignore the factorial structure and analyze the experiment as a simple design. In both cases, the experimenter forgoes a lot of information due to complexity of statistical analysis. The correct way of analyzing such experiments is to partition the treatment sum of squares to Main effects, Interaction effect(s) and an effect called, Control versus rest of the treatments. The partitioning of sum of squares involves writing series of treatment contrasts and estimating the contrast effects and testing them. This becomes increasingly complex when the number of factors is more or the

Output Produced

Source	DF	SS	MS	FValue	ProbF
block	2	95690.40	47845.20	0.46	0.6379
trt	9	25283006.17	2809222.91	27.07	<.0001
Dose	2	8533996.96	4266998.48	36.89	<.0001
Source	2	2603004.52	1301502.26	11.25	0.0009
Dose*Source	4	569349.04	142337.26	1.23	0.3372
CTRL vs REST	1	13576655.65	13576655.65	130.81	<.0001
Error	16	1850918.81	115682.43	—	—

levels of the factors are more than 3.

To analyze such experiments, a SAS macro has been developed and is now under testing. The following are the features of the macro:

- Can handle any number of factors with any levels
- Partition the sum of squares due to treatments with appropriate main effects and interaction effects and test them
- Produce Means for interaction effects and main effects

4. Information System for All-India Coordinated Research Projects Purpose

The main purpose of the AICSIP automation is To develop an information system which can facilitates

planning of experiments at AICRP, maintains information about the experiments at a centralized place, allows enter/upload experimental data during the course of experiment (or at the end) and ability to carry out appropriate statistical analysis and automate uniform reporting process. It is also expected that it should serve as a model and flexible enough so that other AICRPs can use it with no/little modifications. Further, this system is expected to standardize data collection and statistical analysis across AICRPs.

Users and Roles

Various roles were identified in the Information System depending on the nature of their interaction with the information system. The roles are (i)Experimenter-Incharge (ii) Experimenters (iii)Group Head (iv)Admin (v)Registered Users (vi) Guests

Different Modules in AICSIP automation system and Process Flow

There are 5 modules in AICSIP automation, namely Experiment Creation Module, Data Upload and Scrutiny, Analysis Module, Management Module & Admin Module. The following section explains each module in detail.

Experiment Creation Module

The different tasks in this module are (i) Updating the genotype lines database, (ii) Experiment Planning, (iii) Randomized Layouts (iv)View/Print Randomized layouts. Before planning of the experiments, the genotype lines database should be updated so that it becomes easy while planning the experiment. The updating will involve typically two tasks, namely

- Enter new lines received from different centres and assign SPH/SPV numbers. Numbers are assigned automatically based on the last number assigned
- Update Levels of testing for the lines based on last year trials/recommendations from the annual workshop

This will ensure that only relevant entries are shown automatically while creating advanced trials. The user(s) with "admin" role will be allowed to make these changes.

Types of Experiments

The next step in Experiment creation is to create experiment details identifying the type of experiments, treatments (lines & checks or Fertilizer levels etc.), statistical design to be used, locations where the experiments to be conducted, observations to be collected etc. The types of experiments which can be created are as follows:

- Breeding trails
- Initial Trials

- Advanced Trials
- Late Sown Trials
- Plant Protection Trials
- Entomology Trials
- Pathology Trials
- Plant Production Trials
- Agronomy Trials
- Plant Physiology Trials
- Other Trials

The Breeding trials are expected to be created first as the other trials such as plant protection trials may include same lines as treatments.

Late Sown Trials

Late sown trials are those trials in which the same lines are included but sown late in the season. Since all the information are already available, experimenter-in-charge is required to specify locations where these trials are to be conducted. A new experiment ID is created for each late sown trials.

Plant Protection Trials

Using this option, one can create an experiment based on the Breeding trials. The experiment in-charge of Entomology/Plant Pathology shall choose the breeding trials to use, additional checks to include, locations where the trails will be conducted and observations to be collected. The statistical design which can be used in these trials is restricted to Randomized Block Designs.

Plant Production/Any other Trials

Using this option, experiment in-charges of Agronomy and other disciplines can create experiments. The differences between this and breeding trials are use of two factors with different levels as treatments, wide variety of statistical designs to choose from (CRD, RBD, Factorial CRD, Factorial RBD and Split Plot). The same option can also be used for creating any other type of trials.

The information entered during the experiment creation tasks are saved in the database. This information for a particular experiment is accessible only to those who are designed as Experiment In-charge for that experiment.

Creation of Randomized Layouts

After all experiments are created, the next step is to create randomized layouts. This step is to be performed by the experiment in-charge for each experiment separately. During this process, the experiment in-charge should decide on use of random coding of genotype lines in breeding trials. It is possible to code genotype lines differently in each replications or use the same random code in all

replications. The starting number should also be specified by the experiment in-charge. In case of different random coding in each replication, the system will automatically start codes after 50. For example, if there are 25 treatments in a trial and the experiment in-charge choose 1000 to be starting number for the random coding and there are 3 replications, the treatments will be coded from 1001 to 1025 for replication 1; 1051 to 1075 for replication 2 and 1100 to 1125 for replication 3. In case, there are more than 50 treatments in a trial, continuous coding will be used.

Most of the time in breeding experiments, local checks are also included as one of the checks. In such cases, the local checks will be assigned the last random code in each replication for easy identification.

In Plant Protection trials, the random coding used in breeding trials will be used. The checks in the plant protection trials are not coded.

In Late sown trials, the random coding created in the corresponding trial will be used. This step creates the randomized layouts for each location in the experiment. After this step, no changes in the treatments/locations are allowed in the experiment.

View/Print Experiment Layouts

Location: Akola

Design:RBD

Randomized Layout

After randomization step, one can view the randomized layouts and other details. The detailed information (in PDF form) includes title, experiment type, locations, in-charges, treatment coding and layouts of each location. A typical page is shown here. Only concerned experiment in-charge is allowed to view the keys to the random coding.

Plot Number	Replication 1	Replication 2	Replication 3
1	9006	9061	9104
2	9011	9058	9107
3	9008	9060	9106
4	9009	9057	9111
5	9002	9059	9109
6	9005	9053	9101
7	9010	9055	9110
8	9003	9051	9102
9	9007	9052	9108
10	9001	9054	9103
11	9004	9056	9105

Others are not allowed to view this information. For those who are from cooperating centre who are designated as location in-charge, can view the randomized layouts of their centre only.

Data sheet download and Upload Module

All the cooperating centre users who have been designated as experimenters can download the datasheets for each of their experiments. The datasheet downloaded will be in Microsoft®Excel® format. The excel file will include all the relevant details as per the layout (i.e. treatments will appear as per the layout). After entering the information for each plot on all the observed characters, the same excel file can be uploaded to the system.

Data Scrutiny and Analysis Module

The data uploaded by individual centres can be monitored by the concerned experiment In-charge. In case of wrong data entries or important characters to be observed are blank in the uploaded file, the experiment In-charge can reject the data uploaded and ask for correction and fresh upload. In the analysis module, the experiment In-charge can opt for individual character/location/zone or multiple

characters/locations/zones etc. If any character measured are on plot-wise (for example, grain yield), these would be changed to standard unit area such as per hectare. The analyzed report includes actual lines used in the experiment, location-wise analysis and zone wise analysis.

8222 Questions - Answered :

- How do simplify the complex analysis using SAS macros
- Creating web-interface for AICRP experiments

8223 Process/Product/Technology/Developed :

- SAS Macro for split-split, Augmented, Split Factorial Designs and Factorial experiments with extra treatments
- Information System for All-India Coordinated Research Projects (Applied for copyright)
- Different Training Manuals

8224 Practical Utility :

(Not more than 150 words)

- The macros developed under the project would be useful for the scientists to analyze experimental data obtained from augmented design, split-split plot and split-factorial designs. The customized output in RTF would facilitate faster and correct method of statistical analysis besides providing proper format for preparing statistical reports. The web-interface of AICRP analysis would be useful for all All-India Coordinated Research Projects of ICAR system

8225 Constraints, if any : NIL

823 Publications and Material Development :

(One copy each to be supplied with this Proforma)

Books/ Book chapters/ Abstracts/ Popular articles, Brochures, etc.

1. Training Resource Material

S. No.	Title
1	Training Manual on Data Analysis Using SAS
2	Training Manual on Data Analysis Using SAS – A Ready Reckoner for Dairy Managers

3	Training Manual on Survey Design and Data Analysis Using SAS in Social Science
4	Case Study on Working with SAS-ESRI Bridge

8231 Research Papers :**Research Publications****8232 Popular Articles/ Book Chapters :****8233 Reports/Books:****8234 Seminars, Conferences and Workshops (Relevant to the Project) in which the Scientists have Participated :**

(List abstracts forwarded)

Dhandapani, A. (2013). Developing information system for Large Scale Agricultural Trials. Invited talk at Statistics 2013, International Conference Organized at Dr. C.R. Rao Institute, Hyderabad, December 28.

Dhandapani,A. (2014). Information System for All India Coordinanted Research Project. Invited talk at Annual Conference on Statistics, Computers and Applications on 26-02-2014 at Bhagat Phool Singh Mahila Viswavidyalaya, Khanpur kalan, Sonapat.

824 Infrastructural Facilities Developed :

(Details of field, laboratory, notebooks and final material and their location)

1. Assets Generated**(i) Equipment**

S.No.	Name of the equipments with manufacturers name, model and Sr.No.	Year of Purchase	Quantity (No.)	Total Cost (Rs.)
1.	Desktop PC Manufacturer: Dell Model No. Optiplex 780 Sr. No. 10508663080; 25746139432; 30099704104; 34453268776; 14862227752; 19215792424; 21392574760; 36630051112; 17039010088; 12685445416.	2010	10	5.88976
2.	Laptop computer Manufacturer: Dell	2010	1	0.46000

	Model No.: Inspiron 1545 Sr.No.S/N-DFWT4BS P/N-C985PA01			
3.	Laser printer Manufacturer : HP Model No. Ljp2055 dn Sr.No. CNCKS00219	2010	1	0.37403
4.	Flatbad scanner Manufactuarer: Hawlett Packward Model No. G3110 Sr. No.: CN99AA505B	2010	1	0.09905
5.	Online UPS APC 5 KVA Manufacturer: SURTD Model No. 5000UXI Sr. No.: JS-0827000709	2010	1	0.81530
6.	LCD projector Manufacturer: Sharp Model No.PG-F312X Sr. No.: GC 90069S16236	2010	1	0.82405
7.	Photocopier Manufacturer: Sharp Model No. AR 5520 N 93037237	2010	1	1.16759
8.	Split AC Manufacturer: LG with unistab stabilizer Model No. LSA-6C2VF2 US 500B Sr. No.: 910NLSH004110; 910NLDA003562.	2010	2	0.63420
Total above: A.				10.26398
4% Taxes over A:				0.41056
Grand Total Expenditure on Furniture				10.67454

(ii) Works

N I L

(iii) Furniture

S.No.	Name of the equipments	Year of Purchase	Quantity (No.)	Total Cost (Rs.lakhs)
1.	Tables	2010	18	0.997
2.	Stool	2010	1	

825 Comments/Suggestions of Project Leader regarding possible future line of work that may be taken up arising out of this Project :

The information system developed under the project will be useful in developing similar information system for other AICRPs. Besides, this will also pave the way for designing such system leading to Standard Data Repository at National level for ICAR institutes.

Part - IV : Project Expenditure

830 Total Recurring Expenditure : See Project Budget

8301 Salaries : (Designation with pay scale)

Estimated

Actual

- i) Scientific
- ii) Technical
- iii) Supporting
- iv) Wages

Sub-total

8302 Consumables :

- i) Chemicals
- ii) Glasswares
- iii) Others

Sub-total

8303 Travel :

8304 Miscellaneous :
(Other costs)

8305 Sub-total
(Recurring)

831 Non-recurring Expenditure :
(Equipment and works)

- i)
ii)
iii)

832 Total
(830 and 831)

Project Budget

Items of Expenditure	Total Outlay	Released					Expenditure Incurred					Total Expenditure	Total Release	Balance as on Dec 2013
		1st Year	2 nd Year	3rd Year	4th Year	5th Year	1st Year	2nd Year	3rd Year	4th Year	5th Year			
A. Recurring Contingencies														
(1) TA	2.902	0.38	0.74	0	0.5	0.2	0	1.025	0.632	0.49	0.974	3.121	1.82	-0.764
(2) Workshops	3.116	0.88	0.87	0	1	0.5	0	1.115	0	0.52	0	1.635	3.25	0.98
(3) Contractual Services	10.338	0.94	2.522	0	0.624	1.313	0.655	2.223	1.753	2.496	1.872	8.999	5.399	-2.223
(4) Operational costs	4.53	0.5	1.462	0	0.35	0.5	0.537	1.113	0.567	0.09	0	2.307	2.812	0.76
<i>Sub-Total of A(1-4)</i>	20.886	2.7	5.594	0	2.474	2.513	1.192	5.476	2.952	3.596	2.846	16.062	13.281	-1.247
B.HRD												0	0	
(1) National Training to be imparted	30.148	4.5	10.5	0	0	2.375	0	4.336	2.113	3.57	1.824	11.843	17.375	-3.019
(2) Foreign Training/ Conference Attendance	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(3) National Consultancy	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(4) Foreign Consultancy	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<i>Sub-Total of B(1-4)</i>	30.148	4.5	10.5	0	0	2.375	0	4.336	2.113	3.57	1.824	11.843	17.375	-3.019
C.Non-Recurring												0	0	
(1) Indigenous	10.675	11.07	-0.396	0	0	0	10.675	0	0	0	0	10.675	10.674	0

Equipment														
(2)New Works and Renovation	1	1	0	0	0	0	0	0	0	0	0	0	1	0
(3)Furniture	0.997	1	0	0	0	0	0.997	0	0	0	0	0.997	1	0
Sub-Total of C(1-3)	12.672	13.07	-0.396	0	0	0	11.672	0	0	0	0	11.672	12.674	0
Amount Refunded on 02-05-2012												8.186	0	
(1) Institutional charges	1.0526	0.135	0.176	0	0.1237	0.12565	0	0.144	0	0	0	0.144	0.56035	0.24935
Grand Total	64.7586	20.405	15.874	0	2.5977	5.01365	12.864	9.956	5.065	7.166	4.67	47.907	43.89035	-4.01665

Part - V : DECLARATION

This is to certify that the final report of the Project has been submitted in full consultation with the Project Workers as per the approved objectives and technical programme and the relevant records, notebooks and materials are available for the same.

Co-investigators : 1

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Signature of the Project Investigator :

[Handwritten signatures of co-investigators and project investigator]

Signature & Comments of the Head of the Division/Section :

Satisfactory results
Rh. Ram

Signature & Comments of the Joint Director (Research) :

R. Kalpana Sastry
डॉ. आर. कल्पना सास्त्री
Dr. R. Kalpana Sastry
अध्यक्ष निदेशक/Joint Director
राष्ट्रीय कृषि अनुसंधान प्रबंध संस्थानी
National Academy of Agricultural Research Management
राजन्धरापुर/Rajandranagar, हैदराबाद/Hyderabad-500 030.

Signature & Comments of the Director :