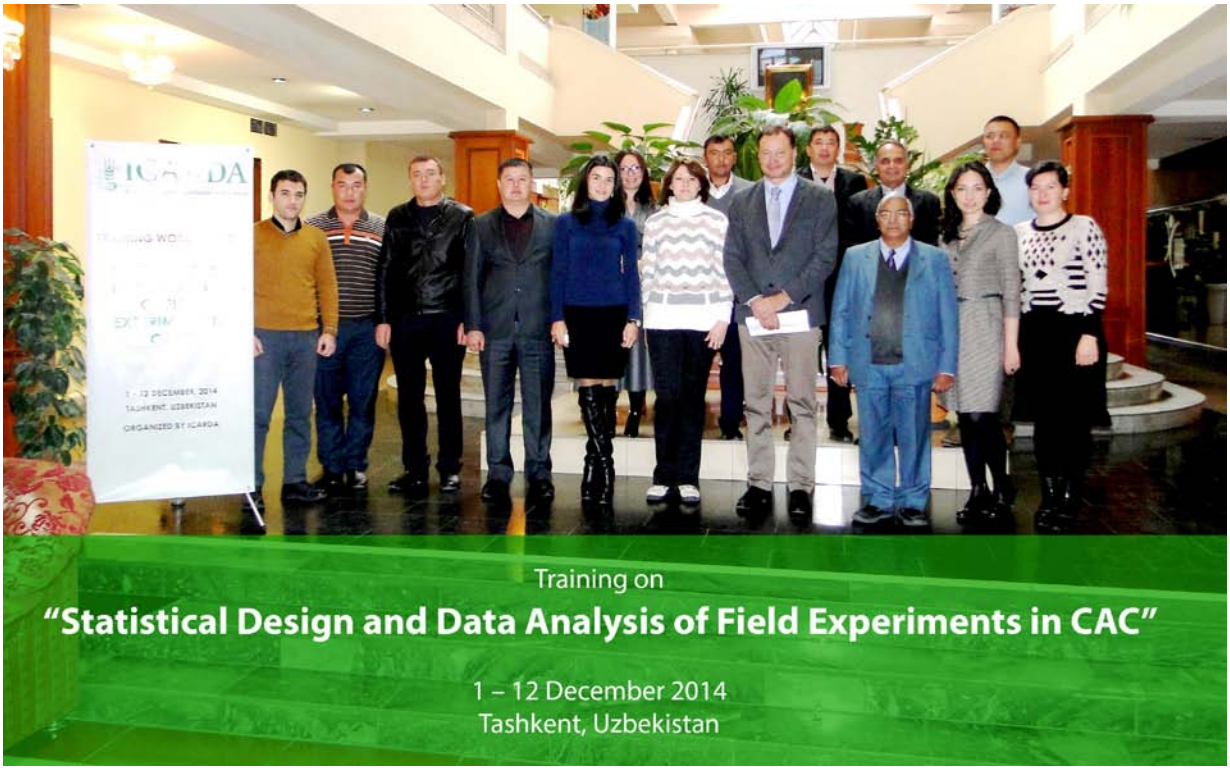
Training Completion Report

Statistical Design and Data Analysis of Field Experiments in CAC

December 1 – 12, 2014,

Organized by

International Center for Agricultural Research in the Dry Areas (ICARDA)



Report Submitted by:

Tashkent, Uzbekistan

Training course

A training course on "***Statistical Design and Data Analysis of Field Experiments in CAC"*** was organized by regional office of the International Center for Agricultural Research in the Dry Areas (ICARDA) in Central Asia and the Caucuses from December 1–12, 2014 at conference hall in "Le Grand Plaza" hotel Tashkent, Uzbekistan.
The purpose of the course was to share with young researchers the knowledge on statistical concepts and methodologies for designing field experiments and biometrical techniques applied in agricultural research, to use the Genstat software and to provide an opportunity to active researchers to carry out statistical analysis of their data. This training was organized within the framework of the project CRP 1.1. "Dry Land System". Twelve young researchers participated in the training course. The course was delivered through lectures using handouts, power point presentations, online recourses and practical exercises on using Genstat software and BioComputering.

Course Schedule

Monday, 1 December 2014		
Time	Title	Lecturer
09:00 - 11:00	Registration, Welcome Address and Course Opening Session	PFU, CDU, Dr. Ram Sharma
11:00 – 11:30	Welcome Coffee	PFU
11:30 - 13:00	Description of the course / modification of course schedule; Introduction to Genstat,	Dr. Murari Singh Translator's name: Ms. Shakhodat Bobokulova
13:00 - 14:00	Lunch break	PFU
14:00 – 16:00	Basic statistics of a single variable (population, random sample, descriptive statistics)	Dr. Murari Singh Translator's name: Ms. Shakhodat Bobokulova
Tuesday, 2 December 2014		
09:00 - 11:00	Inference on population parameters; Estimation of mean and variance	Dr. Murari Singh Translator's name: Ms. Shakhodat Bobokulova
11:00 – 11:30	Coffee break	PFU
11:30 - 13:00	Test of hypothesis / Test of significance	Dr. Murari Singh Translator's name: Ms. Shakhodat Bobokulova
13:00 - 14:00	Lunch break	PFU
14:00 – 16:00	Continued.	Dr. Murari Singh Translator's name: Ms. Shakhodat Bobokulova
Wednesday, 3 December 2014		
09:00 - 11:00	Measure of association and Correlation, Simple and	Dr. Murari Singh

	multiple linear regression	Translator's name: Ms. Shakhodat Bobokulova
11:00 – 11:30	Coffee break	PFU
11:30 - 13:00	Practical	Dr. Murari Singh Translator's name:
13:00 - 14:00	Lunch break	PFU
14:00 – 16:00	Practical	Dr. Murari Singh Translator's name:
Thursday, 4 December 2014		
09:00 - 11:00	Basics of Experimental design [Terminology, Requirements of a Good Experiment, Fisher's Principles of Experimentation] Designing experiments in Randomized Complete Blocks, ANOVA assumptions, Analysis	Dr. Murari Singh Translator's name: Ms. Shakhodat Bobokulova
11:00 – 11:30	Coffee break	PFU
11:30 - 13:00	Generation of randomized plan in RCBD	Dr. Murari Singh
13:00 - 14:00	Lunch break	PFU
14:00 – 16:00	Practical on analysis	Dr. Murari Singh
Friday, 5 December 2014		
09:00 - 11:00	Designing experiments in incomplete blocks [Need and Mechanisms for reducing experimental error, balanced designs, square lattice designs, rectangular designs, alpha-designs]	Dr. Murari Singh Translator's name
11:00 – 11:30	Coffee break	PFU
11:30 - 13:00	Generation of alpha design using Genstat	Dr. Murari Singh
13:00 - 14:00	Lunch break	PFU
14:00 – 16:00	Analysis of data from experiments in alpha design [REML menu, model, Fixed model, Random model, variance components, Wald test, predicted values: BLUE, BLUP] -REML for RCBD and efficiency of IBD over RCBD	Dr. Murari Singh Translator's name: Ms. Shakhodat Bobokulova
Saturday, 6 December 2014		
09:00 - 11:00	Experimental design p-rep design and analysis	Dr. Murari Singh Translator's name: Mr. Muslim Fazylov
11:00 – 11:30	Coffee break	PFU
11:30 - 13:00	Analysis of data from multi-environment trials in complete blocks [Introduction/objectives, data analysis	Dr. Murari Singh Translator's name:

	from individual environments, homogeneous/ heterogeneous variances, combined analysis of data, GxE interaction] Practical [Combined analysis of data in RCBDs; treatment structure, Block structure]	Mr. Muslim Fazylov
13:00 - 14:00	Lunch break	PFU
14:00 – 16:00	Analysis of data from multi-environment trials in incomplete blocks Practical [Combined analysis of data in IBDs; Fixed model, Random model; BLUPs]	Dr. Murari Singh Translator's name: Mr. Muslim Fazylov
Sunday, 7 December 2014		
Monday, 8 December 2014		
09:00 - 11:00	Analysis of data from multi-environment trials [stability analyses, partitioning of GEI, additive main-effects and multiplicative interaction]	Dr. Murari Singh Translator's name Mr. Muslim Fazylov
11:00 – 11:30	Coffee break	PFU
11:30 - 13:00	Practical	Dr. Murari Singh
13:00 - 14:00	Lunch break	PFU
14:00 – 16:00	Spatial analysis of field trials Practical	Dr. Murari Singh
Tuesday, 9 December 2014		
09:00 - 11:00	Cluster analysis	Dr. Murari Singh Translator's name: Mr. Muslim Fazylov
11:00 – 11:30	Coffee break	PFU
11:30 - 13:00	Principal Component analysis	Dr. Murari Singh Translator's name: Mr. Muslim Fazylov
13:00 - 14:00	Lunch break	PFU
14:00 – 16:00	Practical	Dr. Murari Singh
Wednesday, 10 December 2014		
09:00 - 11:00	Factorial experiments: Two-factor factorial in RCB	Dr. Murari Singh Translator's name: Mr. Muslim Fazylov
11:00 – 11:30	Coffee break	PFU
11:30 - 13:00	Two-factor factorial in RCB – Practical (Design and Analysis)	Dr. Murari Singh
13:00 - 14:00	Lunch break	PFU
14:00 – 16:00	Practical	Dr. Murari Singh
Thursday, 11 December 2014		
09:00 - 11:00	Design and analysis of split-plot in RCB Design and analysis of strip-plot experiments in RCB	Dr. Murari Singh Translator's name: Mr. Muslim Fazylov

11:00 – 11:30	Coffee break	PFU
11:30 - 13:00	Practical [Split-plots & Strip-plots]	Dr. Murari Singh
13:00 - 14:00	Lunch break	PFU
14:00 – 16:00	Online BioComputing	Dr. Murari Singh
Friday, 12 December 2014		
09:00 - 10:30	Overview/Open session	Dr. Murari Singh
10:30 - 11:00	Coffee break	PFU
11:00 - 14:00	- Course evaluation, - Closing Ceremony	CDU, PFU, Dr. Ram Sharma
14:00 - 15:00	Lunch break	PFU

Course evaluation by the participants (Number of evaluators = 12)

At the end of the training, a course evaluation was conducted; all the participants who evaluated the course remain anonymous.

An analysis of the responses (reported in %) to different aspects of the course is given below.

	Disagree (%)		Agree (%)			Total (%)
	1	**2**	**3**	**4**	**5**	
1. Contents of the course						
Relevance of the course to your job	0	0	0	8	92	100
Accomplishment of subject matter	0	0	0	8	92	100
Clarity of course objectives	0	0	0	0	100	100
Level of lectures	0	0	0	0	100	100
Time allocated for discussions	0	0	0	25	75	100
Interaction with participants enrolled in the course	0	0	0	25	75	100
Overall, how would you rate this course	0	0	0	0	100	100
2. Schedule and time allocation						
Percentage of Time allocated to lectures	0	0	0	25	75	100
Usefulness of Lectures	0	0	0	0	100	100
3. Teaching aids						
Effectiveness of teaching aids in general	0	0	0	8	92	100
Clarity of slides/overheads/Power point	0	0	0	0	100	100
Handouts and material	0	0	0	0	100	100

4. Administrative arrangements						
Item/rating/percentage	0	0	0	0	100	100
Pre-course communication	0	0	0	0	100	100
Payment of allowance on time	0	0	0	0	100	100
Transportation	0	0	0	0	100	100
Lecture rooms	0	0	0	0	100	100

Group training instructor evaluation by the participants, score from 1 to 5 (1=the lowest/ 5 = the highest), (Number of evaluators = 12)

Instructor Name	**Title of Presentation**	**Mastery of subject matter**	**Ability to create and sustain interest**	**Openness to ideas of trainees**	**Time management**	**Clarity of speech**
Dr. Murari Singh	Basic statistics of a single variable (population, random sample, descriptive statistics)	5 (100%)	5 (92 %) 4 (8%)	5 (100%)	5 (100%)	5 (100%)
	Inference on population parameters; Estimation of mean and variance	5 (92 %) 4 (8%)	5 (92 %) 4 (8%)	5 (100%)	5 (100%)	5 (100%)
	Test of hypothesis / Test of significance	5 (100%)	5 (100%)	5 (100%)	5 (100%)	5 (92 %) 4 (8%)
	Measure of association and Correlation, Simple and multiple linear regression	5 (100%)	5 (100%)	5 (92 %) 4 (8%)	5 (100%)	5 (100%)
	Basics of Experimental design [Terminology, Requirements of a Good Experiment, Fisher's Principles of Experimentation] Designing experiments in Randomized Complete Blocks, ANOVA assumptions, Analysis	5 (100%)	5 (92 %) 4 (8%)	5 (100%)	5 (92 %) 4 (8%)	5 (100%)
	Generation of randomized plan in RCBD	5 (100%)	5 (100%)	5 (100%)	5 (100%)	5 (100%)
	Designing experiments in incomplete blocks [Need and Mechanisms for reducing experimental error, balanced designs, square lattice designs, rectangular designs, alpha-designs]	5 (92 %) 4 (8%)	5 (92 %) 4 (8%)	5 (100%)	5 (100%)	5 (100%)

	Generation of alpha design using Genstat	5 (100%)	5 (100%)	5 (92 %) 4 (8%)	5 (100%)	5 (100%)
	Analysis of data from experiments in alpha design [REML menu, model, Fixed model, Random model, variance components, Wald test, predicted values: BLUE, BLUP]	5 (92 %) 4 (8%)	5 (92 %) 4 (8%)	5 (92 %) 4 (8%)	5 (92 %) 4 (8%)	5 (100%)
	REML for RCBD and efficiency of IBD over RCBD /	5 (92 %) 4 (8%)	5 (92 %) 4 (8%)	5 (92 %) 4 (8%)	5 (92 %) 4 (8%)	5 (100%)
	Experimental design p-rep design and analysis	5 (100%)	5 (100%)	5 (100%)	5 (100%)	5 (100%)
	Analysis of data from multi-environment trials in complete blocks [Introduction/objectives, data analysis from individual environments, homogeneous/ heterogeneous variances, combined analysis of data, GxE interaction]	5 (100%)	5 (100%)	5 (100%)	5 (100%)	5 (100%)
	Analysis of data from multi-environment trials [stability analyses, partitioning of GEI, additive main-effects and multiplicative interaction]	5 (100%)	5 (100%)	5 (100%)	5 (100%)	5 (100%)
	Spatial analysis of field trials	5 (92 %) 4 (8%)	5 (92 %) 4 (8%)	5 (92 %) 4 (8%)	5 (100%)	5 (100%)
	Principal Component analysis	5 (100%)	5 (100%)	5 (100%)	5 (100%)	5 (100%)
	Factorial experiments: Two-factor factorial in RCB	5 (100%)	5 (100%)	5 (100%)	5 (100%)	5 (100%)
	Two-factor factorial in RCB – Practical (Design and Analysis)	5 (100%)	5 (100%)	5 (100%)	5 (100%)	5 (100%)
	Design and analysis of split-plot in RCB Design and analysis of strip-plot experiments in RCB /	5 (92 %) 4 (8%)	5 (100%)	5 (100%)	5 (100%)	5 (100%)
	Online BioComputing	5 (100%)	5 (100%)	5 (100%)	5 (100%)	5 (100%)

Course Impact

- All participants believed that the course was useful to their institution, their own on-going research activities, and they felt confident to be able to extend the knowledge gained during the training to their co-researchers, seed producers and farmers involved in production of wheat seed.

List of participants

№	Name	Gender	Name of Organization	Country	E.mail
1	Mr. Elchin Hajiev	Male	Scientific Research Institute of Genetic Recourse	Azerbaijan	elcin_haciyev_1985@mail.ru
2	Ms. Nino Katcharava	Female	Scientific Research Institute of Crop Science	Georgia	n.katcharava@agruni.edu.ge
3	Mr. Akbar Abduazimov	Male	Kashkadarya Research Institute of Breeding and Seed Production of Cereal Crops	Uzbekistan	akbar.abduazimov@mail.ru
4	Mr. Diyor Juraev	Male	Kashkadarya Research Institute of Breeding and Seed Production of Cereal Crops	Uzbekistan	di.yor@mail.ru
5	Mr. Akmal Meyliev	Male	Kashkadarya Research Institute of Breeding and Seed Production of Cereal Crops	Uzbekistan	akmal_8417@mail.ru
6	Mr. Zafar Ziyaev	Male	Kashkadarya Research Institute of Breeding and Seed Production of Cereal Crops	Uzbekistan	zafaruzripi@gmail.com
7	Dr. Yulduzoy Djumaniyazova	Female	Urgench State University	Uzbekistan	yulduz.d@gmail.com
8	Mr. Izzat Kuryazov	Male	Urgench State University	Uzbekistan	Izzat_84@mail.ru
9	Dr. Mariya Glazirina	Female	ICARDA-CAC		
10	Mr. Tulkun Yuldashev	Male	ICARDA-CAC	Uzbekistan	t.yuldashev@cgiar.org
11	Dr. Dinara Muzafarova	Female	ICARDA-CAC	Uzbekistan	d.muzafarova@cgiar.org
12	Dr. Safar Alikulov	Male	Uzbek Research Institute of Plant Industry	Uzbekistan	safaruzripi@mail.ru
13	Dr.Mamatkul Juraev	Male	Galla-aral Scientific Research Institute of Grain Crops	Uzbekistan	mamatkul1974@yahoo.com