Assoc. Prof. Dr. Choosak Jompuk

Department of Agronomy, Faculty of Agriculture at KPS

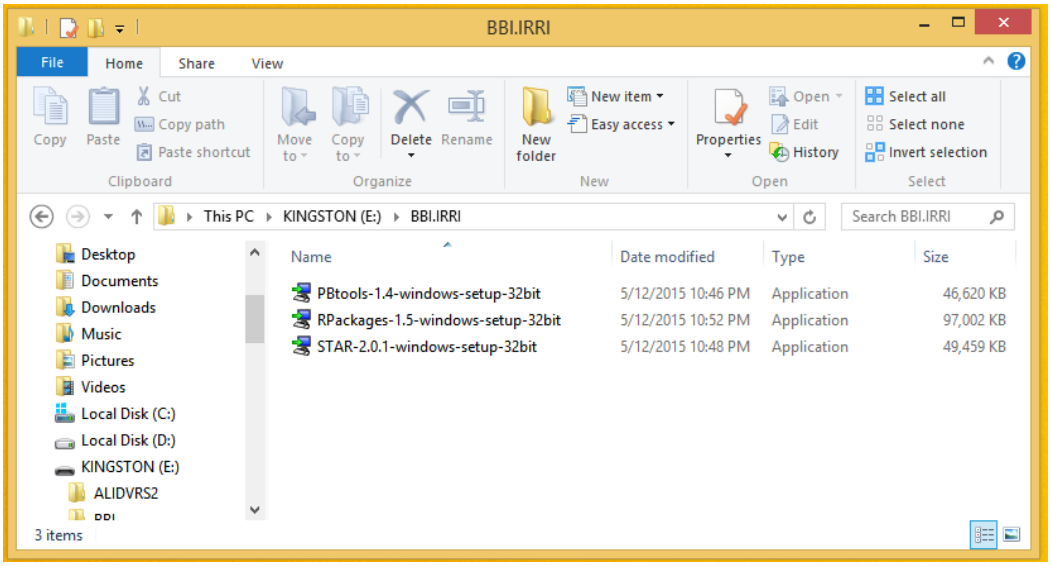
Kasetsart University, KamphaengSaen Campus

Nakorn Pathom

Installation of STAR-2.0.1

1. Down load the STAR from Biometrics and plant breeding Informatics or http://www.bbi.irri.org/

   - Download 3 files, keep them in hard disk as picture



2. Install these files in order

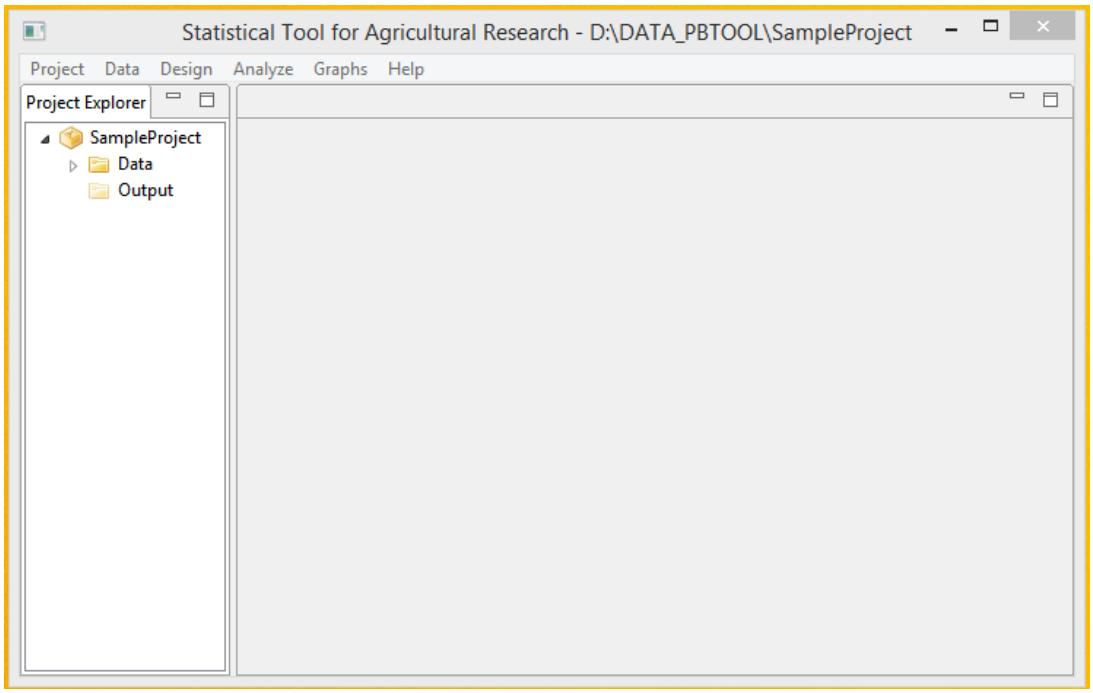
   2.1 RPackages-1.5-windows-setup-32bit by double click, then follow the recommendation

   2.2 STAR-2.0.1-windows-setup-32bit by double click, then follow the recommendation

   2.3 PBtools-1.4-windows-setup-32bit by double click, then follow the recommendation

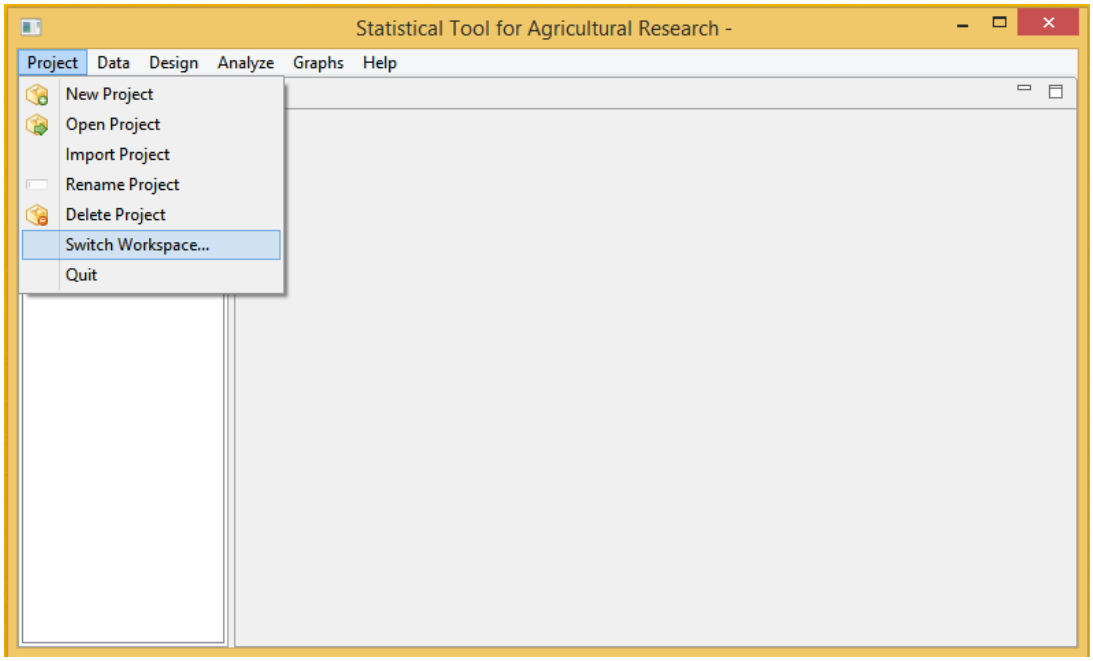
3. Start the STAR-2.0.1

   At desktop, double click this picture 

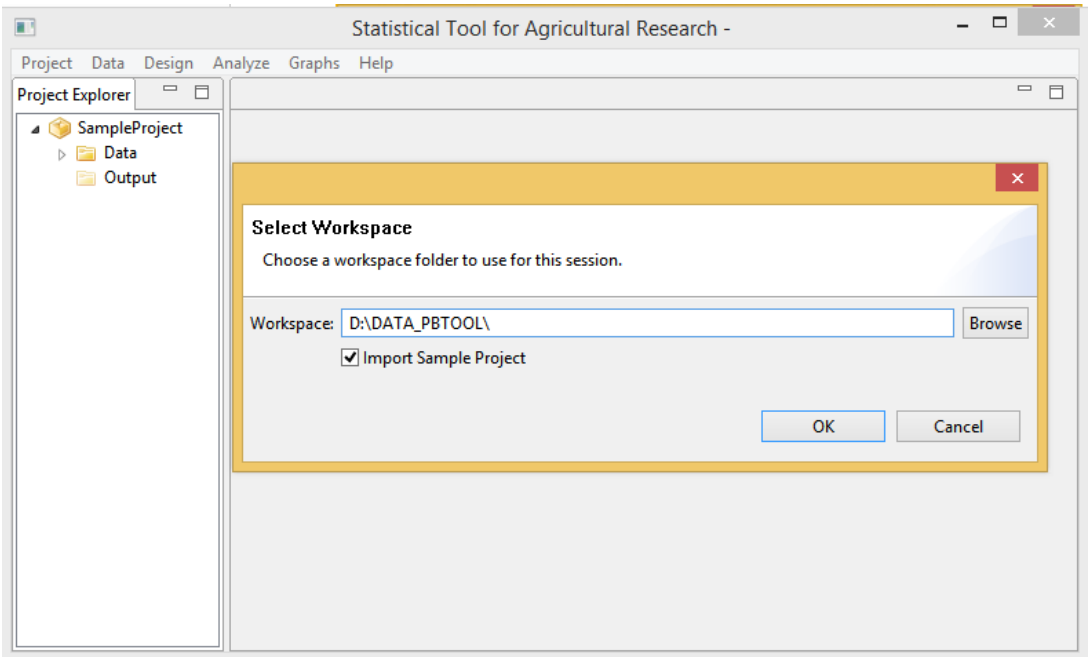


4. Make the folder for STAR

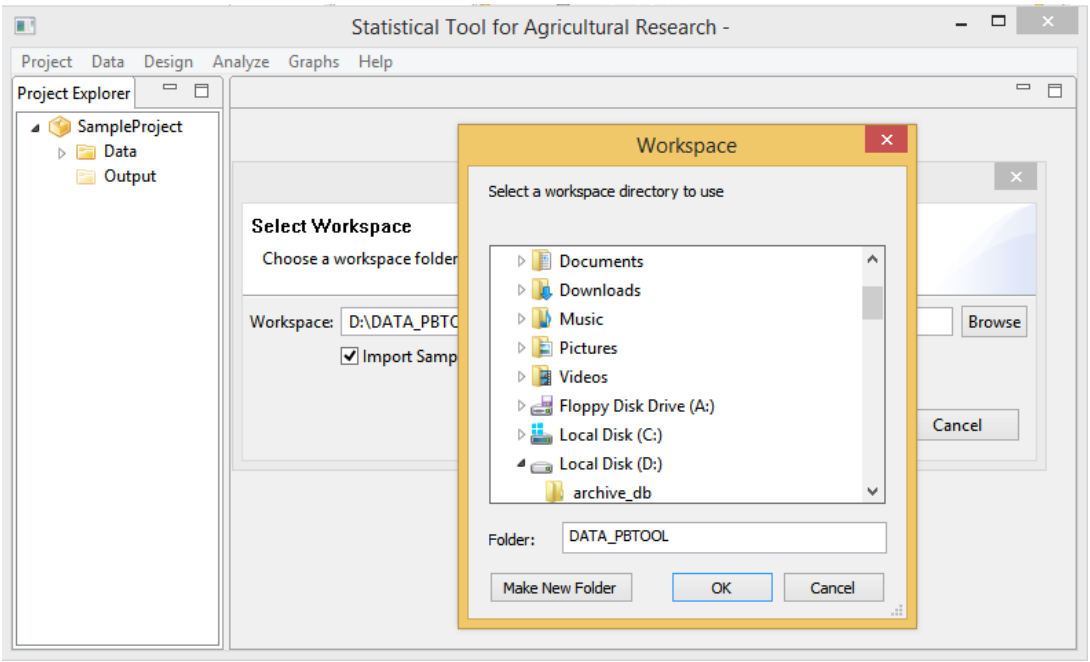
4.1 At the Menu bar of Project, Choose the Switch Workspace



Select Workspace as the picture

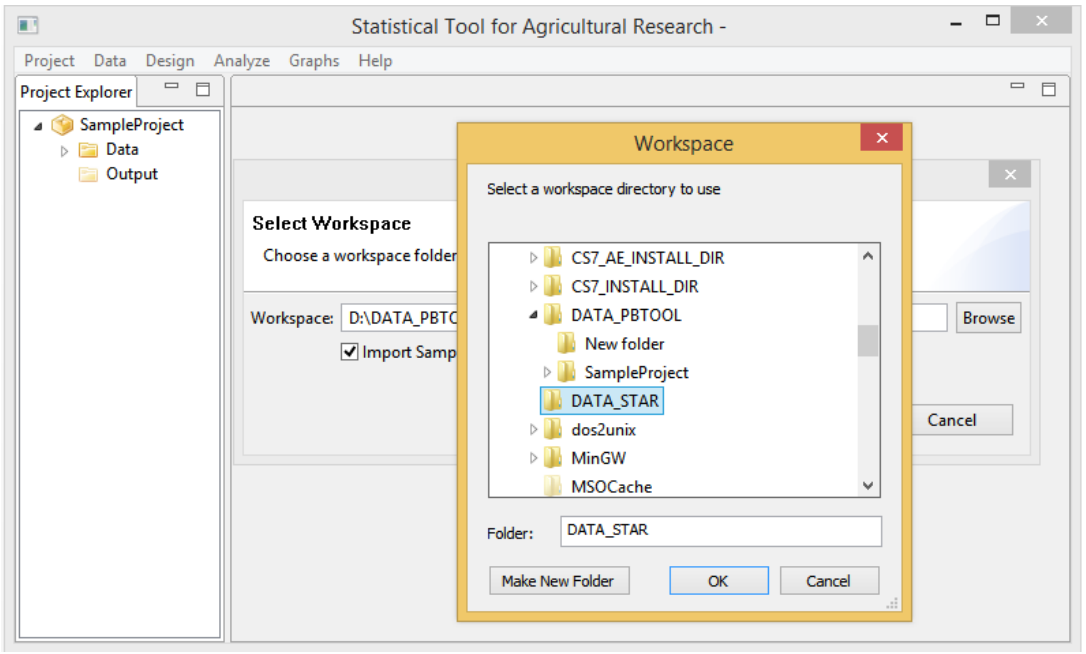


Browse or Make New Folder

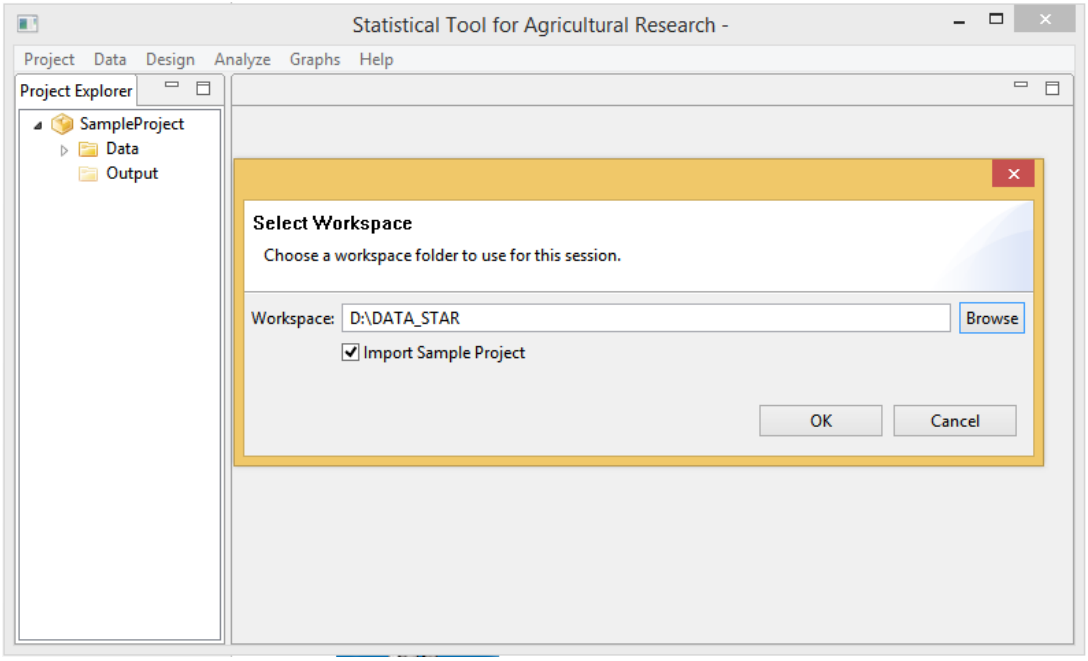


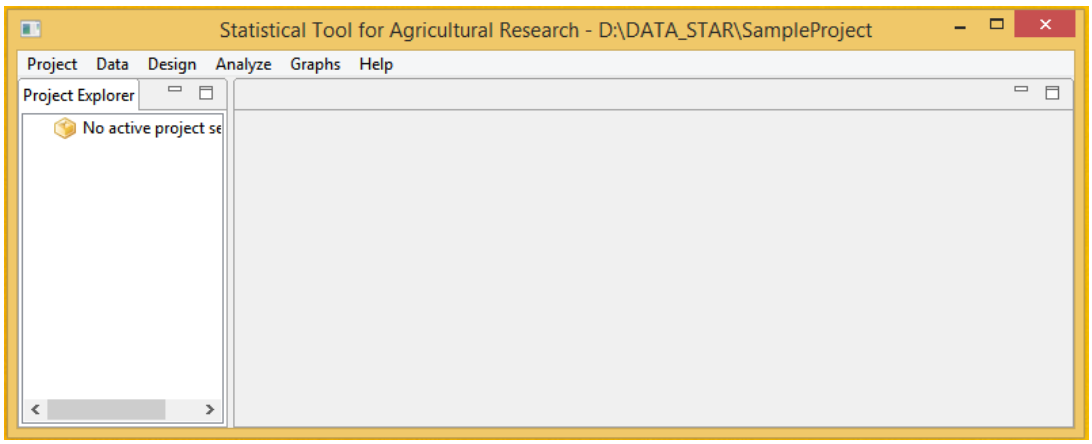
make the project as DATA_STAR

4 Statistical for Agricultural Research (STAR)



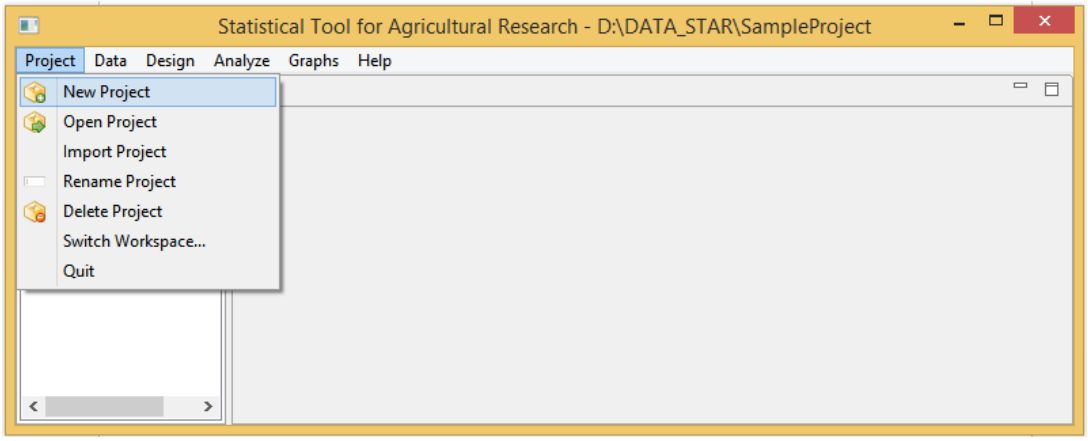
You will get the Workspace working on folder D:\DATA_STAR





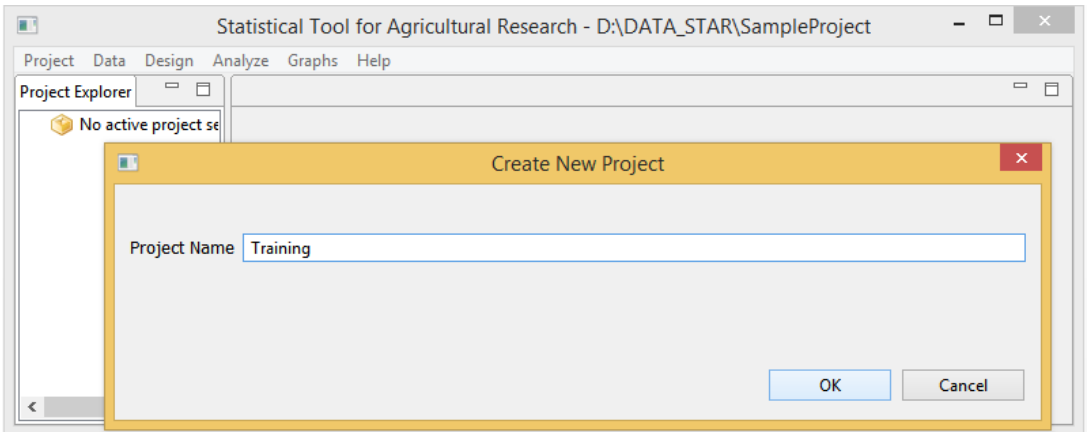
4.2 Make the New Project

At menu bar, Choose Project as picture

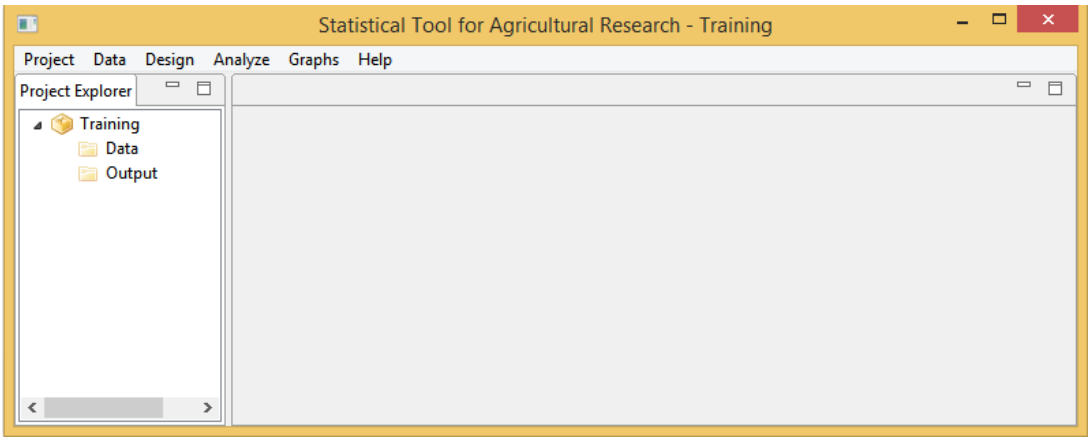


by choose the New Project, then Create New Project will appear

at the Project Name, type the Training, the click OK

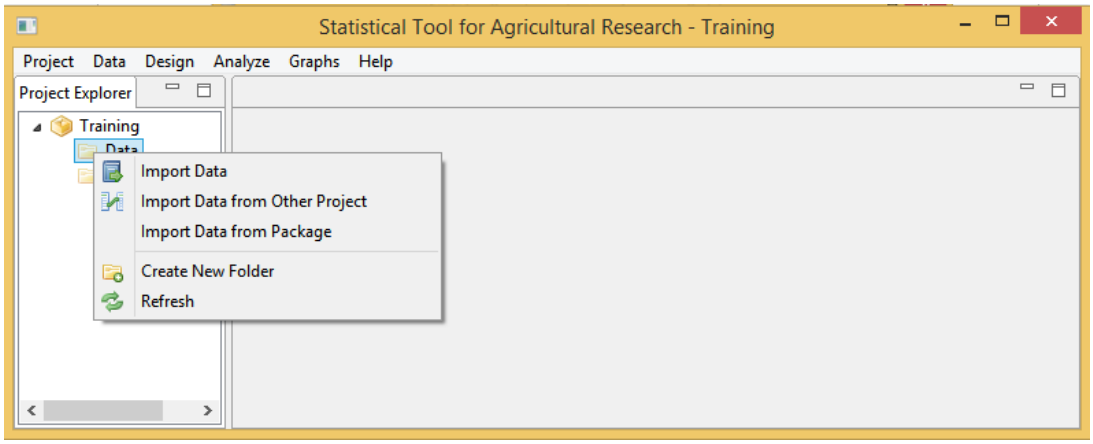


you will get….



5. How to import the data to STAR-2.0.1

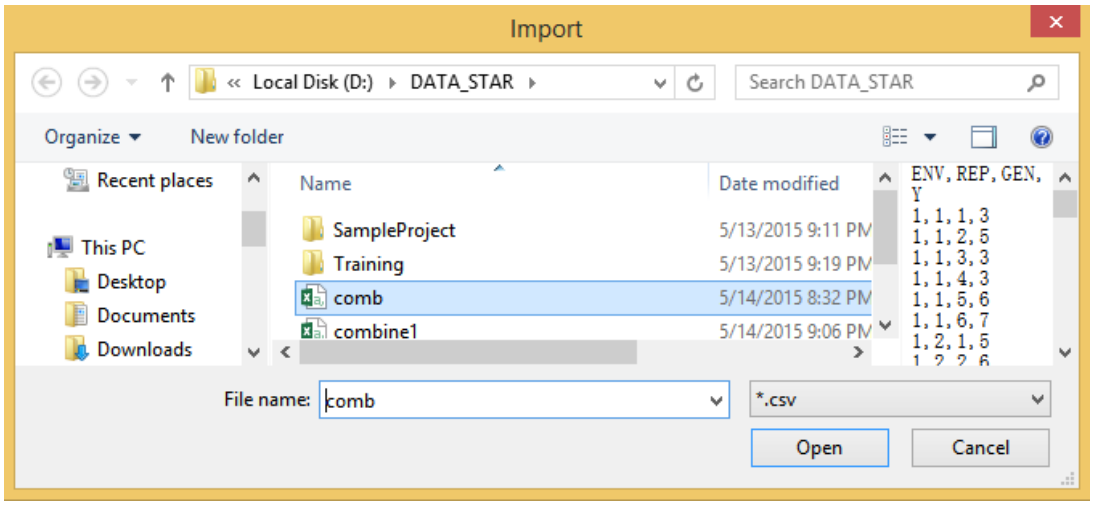
5.1 At the Project Training, Click the Data by Mouse.



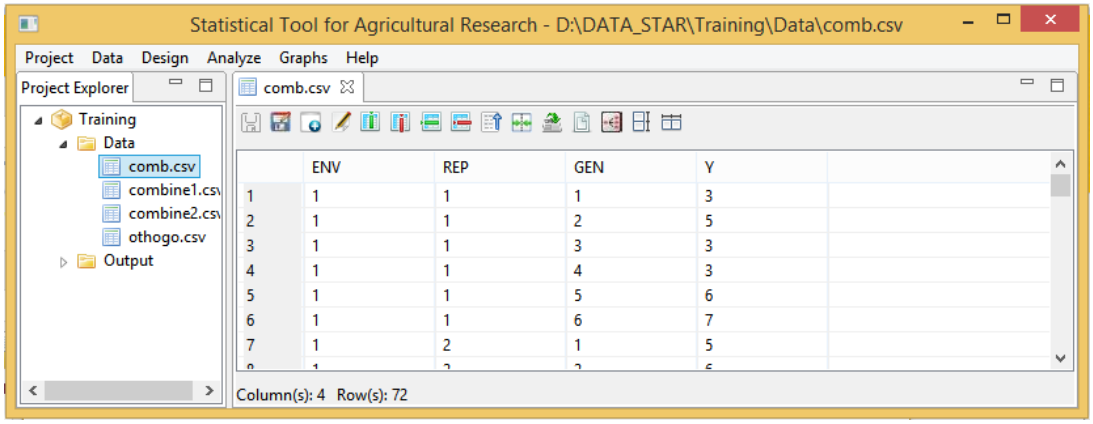
There are many ways to import data to STAR

- Import Data
- Import Data from Other Project, ect.

From the Import, choose the comb.csv, then Open



Using mouse click the sign at Data, then choose the file “comb.csv”, then double click



T-Test

1. Group comparison
2. Paired comparison

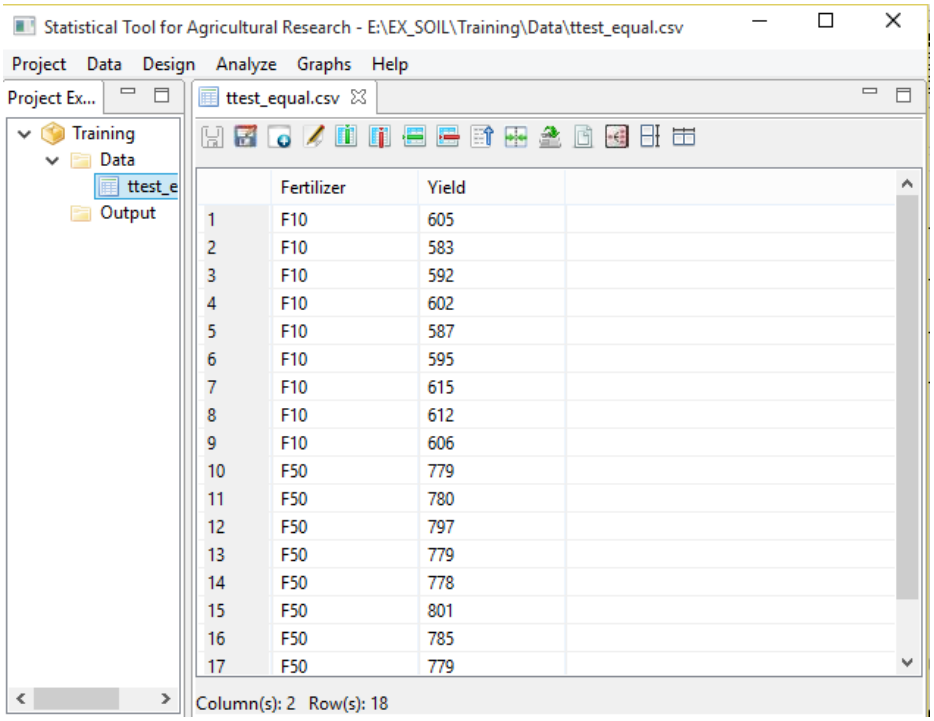
1.1 Group comparison when the variances are equal ($\sigma_1^2 = \sigma_2^2$)

Example 1. Growing the rice, Variety SPR 60. Fertilizer was applied the 10 kg/rai and 50 kg/rai. The grain yield of rice was obtained as table…

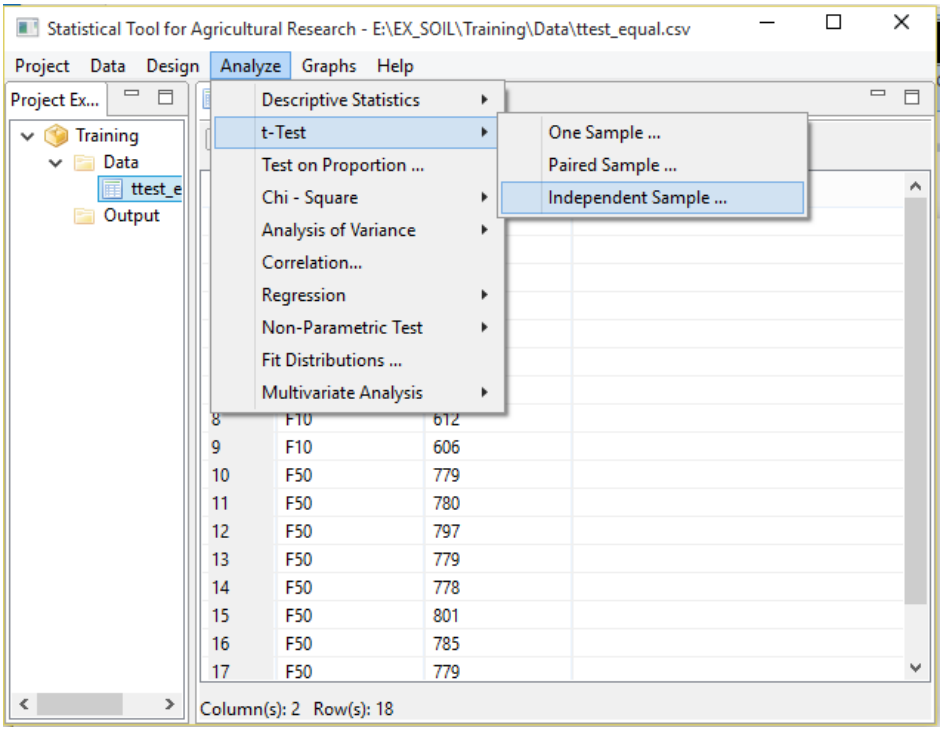
Table 1 Grain yield of rice using fertilizer at 10 and 50 kg/rai.

Fertilizer	Yield (j)									$\overline{Yi.}$
(i)	1	2	3	4	5	6	7	8	9	
F10	605	583	592	602	587	595	615	612	606	599.67
F50	779	780	797	779	778	801	785	779	771	783.22

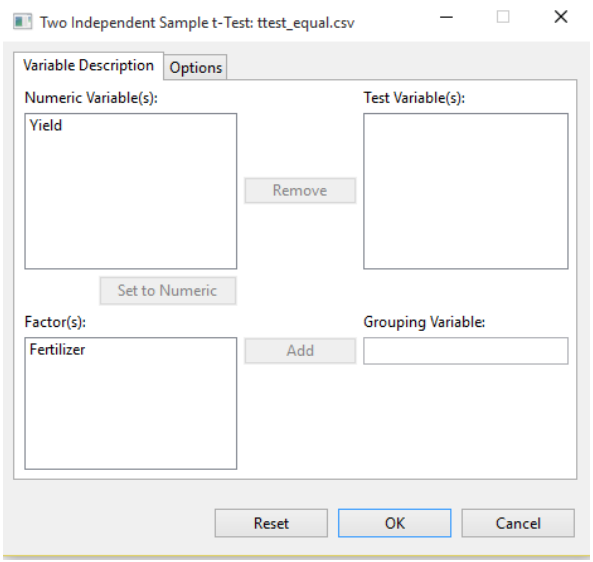
i) import data (----.csv)

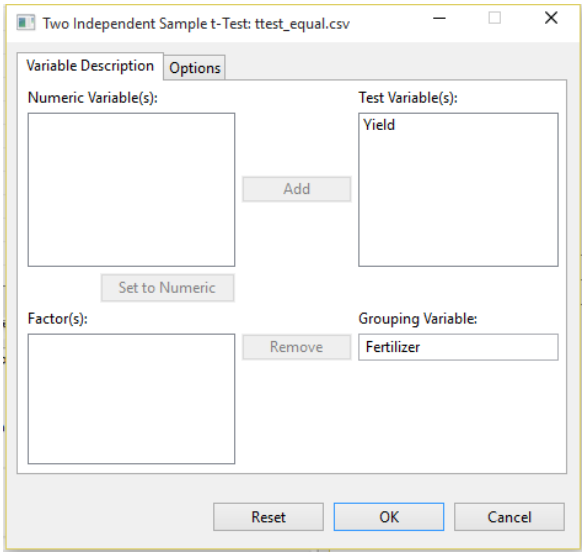


ii) Analysis data of t-test using independent sample

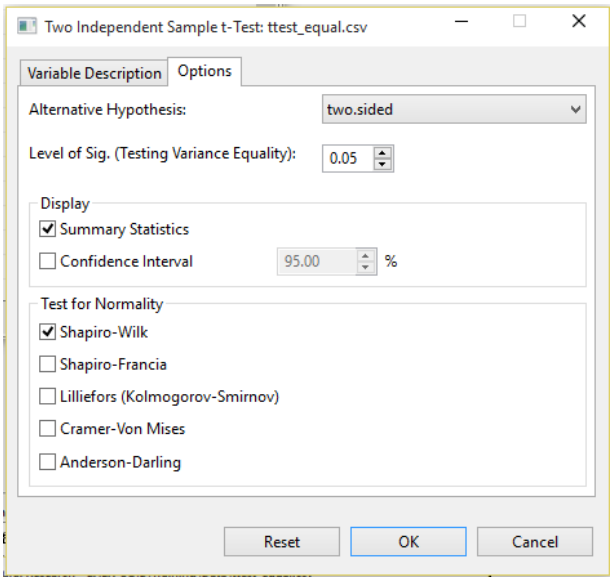


iii) Choose the variable for data analysis





iv) Choosing the Option



v) The results

```
Statistical Tool for Agricultural Research (STAR)
Thu Aug 27 09:28:49 2015

Test for Normality
------------------------------------------------------------------------
Grp          Level   Variable   Method           W Value   Pr(< W)
------------------------------------------------------------------------
Fertilizer   F10     Yield      Shapiro-Wilk      0.9598    0.7965
Fertilizer   F50     Yield      Shapiro-Wilk      0.8409    0.0591
------------------------------------------------------------------------

Descriptive Statistics
-----------------------------------------------------------------
Variable   Fertilizer          N      Mean   StdDev   SE_Mean
-----------------------------------------------------------------
Yield      F10                 9    599.67    11.07      3.69
Yield      F50                 9    783.22     9.68      3.23
Yield      Diff(F10-F50)          -183.56    10.40      4.90
-----------------------------------------------------------------


Homogeneity of Variances
-----------------------------------------------------------
Variable   Method       Num DF   Den DF   F Value   Pr(> F)
-----------------------------------------------------------
Yield      Folded F          8        8      1.31    0.7137
-----------------------------------------------------------

Two Independent Sample t-Test, h0: mean diff = 0
-----------------------------------------------------------
Variable   Method*   Variances      DF   t Value   Pr(>|t|)
-----------------------------------------------------------
Yield      Pooled    Equal          16    -37.45     0.0000
-----------------------------------------------------------
* At 0.05 level of significance.
```

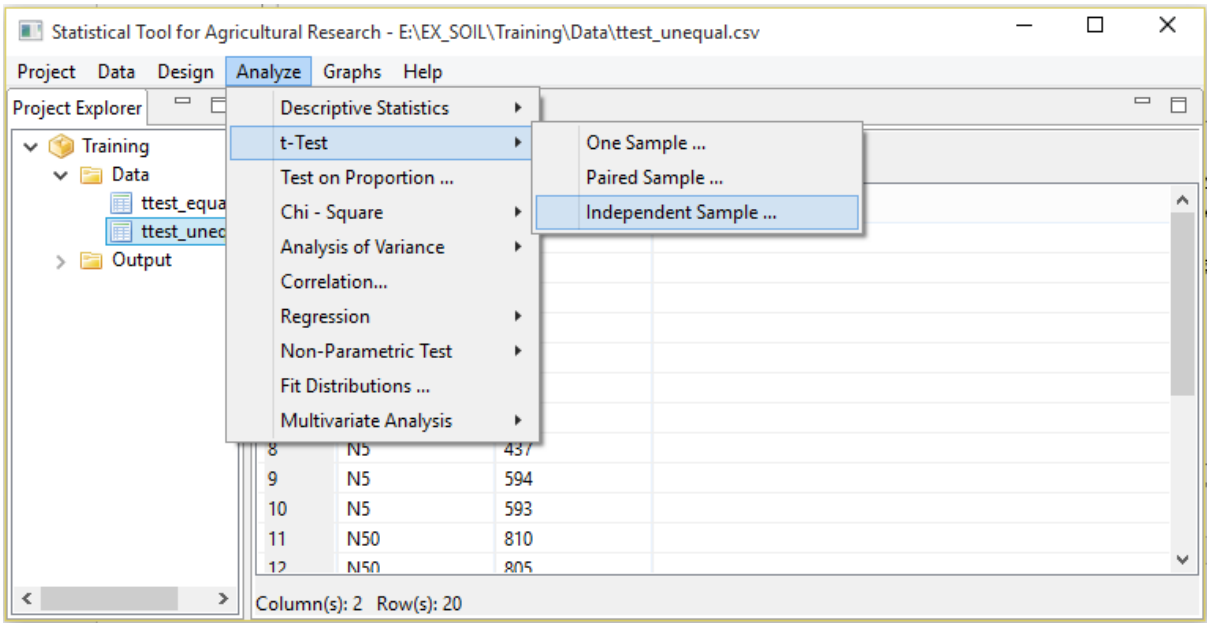
1.2 Comparison of two treatments when the variance of two treatments are not equal($\sigma_1^2 \neq \sigma_2^2$)

Example 2. Growing the rice, Variety SPR 60. Fertilizer was applied the 10 kg/rai and 50 kg/rai. The grain yield of rice was obtained as table…

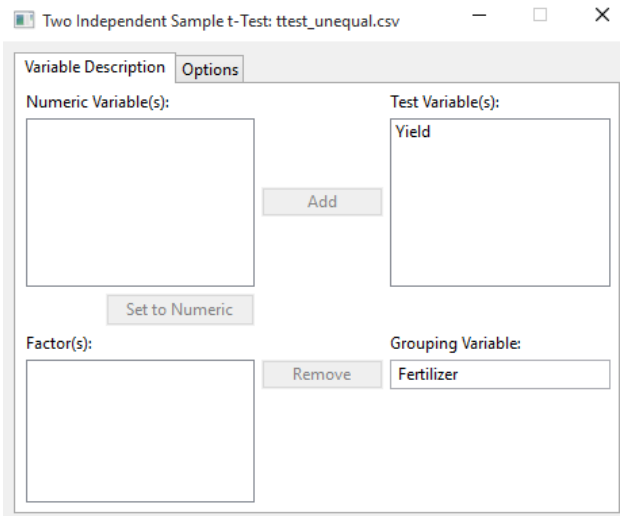
Table 1 Grain yield of rice using fertilizer at 10 and 50 kg/rai.

Fertilizer	Grain yield (j)									$\overline{Yi.}$
(i)	1	2	3	4	5	6	7	8	9	
F10	605	583	592	602	587	595	615	612	606	599.67
F50	779	780	797	779	778	801	785	779	771	783.22

i) import data and choosing t-test of independent sample



ii) Specified the variable description as picture



iii) Results

```
Descriptive Statistics
-------------------------------------------------------------
Variable   Fertilizer         N      Mean   StdDev   SE_Mean
-------------------------------------------------------------
Yield      N5                10    539.40    92.62     29.29
Yield      N50               10    808.40     7.49      2.37
Yield      Diff(N5-N50)           -269.00    65.70     29.38
-------------------------------------------------------------


Homogeneity of Variances
-----------------------------------------------------------
Variable   Method       Num DF   Den DF   F Value   Pr(> F)
-----------------------------------------------------------
Yield      Folded F          9        9    153.05    0.0000
-----------------------------------------------------------

Two Independent Sample t-Test, h0: mean diff = 0
-------------------------------------------------------------------
Variable   Method*         Variances       DF   t Value   Pr(>|t|)
-------------------------------------------------------------------
Yield      Satterthwaite   Unequal       9.12     -9.15     0.0000
-------------------------------------------------------------------
* At 0.05 level of significance.
```

The analysis will use the Satterthwaite method when the variance of two treatments are not eaual.

2. Paired comparison

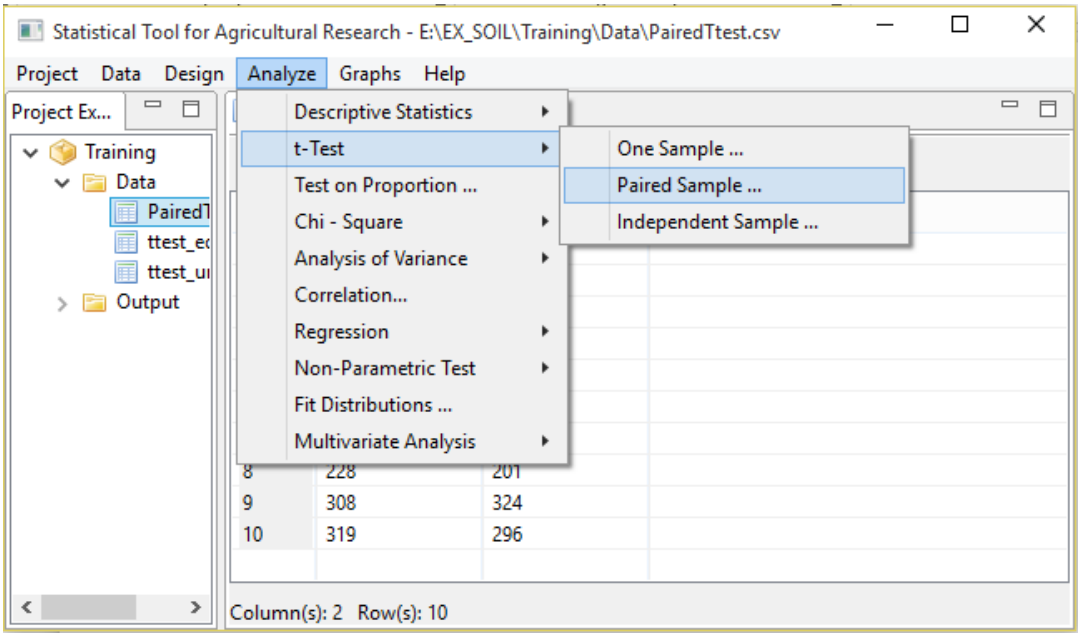
Example 3 Yield trial of corn inbred lines in two herbicides applications.

T1= herbicide application, T2 = no herbicide application

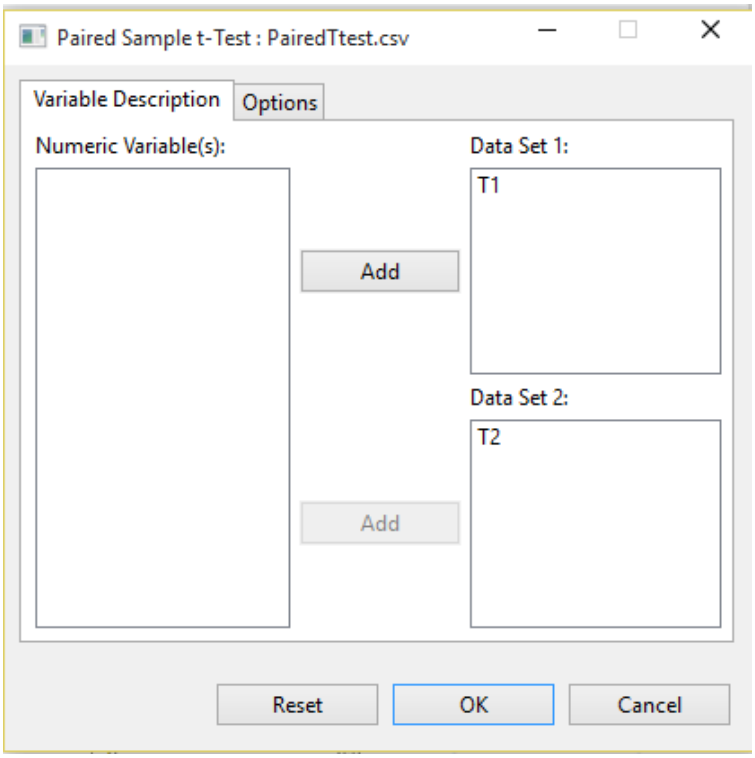
Table 3 Grain yield of corn inbred lines.

	Yield (kg/rai)										
Tr.	Ki1	Ki2	Ki3	Ki4	Ki5	Ki6	Ki7	Ki8	Ki9	Ki10	รวม
T1	253	310	257	272	283	212	342	228	308	319	
T2	191	323	284	238	222	221	343	201	324	296	
d_j	62	-13	-27	34	61	-9	-1	27	-16	23	141
d_j^2	3,844	169	729	1,156	3,721	81	1	729	256	529	11,215

i) import data, then analyze using t-test (paired sample)


Statistical Tool for Agricultural Research - E:\EX_SOIL\Training\Data\PairedTtest.csv
Project
Data
Design
Analyze
Graphs
Help
Project Ex...
Training
Data
Output
Descriptive Statistics
t-Test
Test on Proportion ...
Chi - Square
Analysis of Variance
Correlation...
Regression
Non-Parametric Test
Fit Distributions ...
Multivariate Analysis
One Sample ...
Paired Sample ...
Independent Sample ...
8 228 201
9 308 324
10 319 296
Column(s): 2 Row(s): 10

ii)


Paired Sample t-Test : PairedTtest.csv
Variable Description
Options
Numeric Variable(s):
Data Set 1:
T1
Add
Data Set 2:
T2
Add
Reset
OK
Cancel

iii) Result of paired t-test

Output.txt

```
Statistical Tool for Agricultural Research (STAR)
Thu Aug 27 14:22:27 2015

Test for Normality
------------------------------------------------
Difference   Method           W Value    Pr(< W)
------------------------------------------------
T1 - T2      Shapiro-Wilk      0.9143     0.3118
------------------------------------------------

Descriptive Statistics
-------------------------------------------------------
Difference     N_NonMissObs     Mean    StdDev    SE_Mean
-------------------------------------------------------
T1 - T2                  10    14.10     32.02      10.13
-------------------------------------------------------

Paired Sample t-Test, h0: mean diff = 0
---------------------------------------
Difference      DF    t Value    Pr(>|t|)
---------------------------------------
T1 - T2          9       1.39      0.1972
---------------------------------------
```

Summary….

Completely Randomized Design (CRD)

Example 4 Grain yield of rice at different application of insecticide to control the brown plant hopper (BPH) under completely randomized design (CRD) of 7 treatment with 4 replications

Treatments	Grain yield (kg/rai)				Total	Mean
Dol-Mix(1kg)	405.00	331.04	336.64	278.52	1,351.20	337.80
Dol-Mix(2kg)	538.56	414.56	353.76	407.04	1,713.92	428.48
DDT+BHC	405.76	393.44	452.32	381.60	1,633.12	408.28
Azodrin	381.92	392.48	248.96	338.56	1,361.92	340.48
Dimecron-Boom	319.52	268.64	263.84	297.44	1,149.44	287.36
Dimecron-Knap	287.36	272.64	304.64	211.20	1,075.84	268.96
Control	224.16	242.56	203.20	172.32	842.24	210.56
Grand Total (GT)					9,127.68	
Grand Mean (GM)						325.99

From: Komez and Komez (1984)

A. Hypothesis

H_0 : $\mu_1 = \mu_2 = ... = \mu_t$

H_1 : At least 1 pair of mean is not equivalence (is different)

B. Analysis of variance

1. Analysis of Sum of square

$$CT = \frac{(GT)^2}{n}$$

$$= \frac{(9,127.68)^2}{(4)(7)}$$

$$= 2,975,519$$

$$\text{Total SS} = \sum_{i=1}^{n} Y_i^2 - CT$$

$$= [(405.00)^2 + (331.04)^2 + ... + (203.20)^2 + (172.32)^2] - CT$$

$$= 194,612.5$$

$$\text{Tr.SS} = \frac{\sum_{i=1}^{t} T_i^2}{r} - CT$$

$$= \frac{[(1,351.2)^2 + (1,713.92)^2 + ... + (1,075.84)^2 + (842.24)^2]}{4} - CT$$

$$= 142,776.3$$

$$\text{Error.SS} = \text{Total SS} - \text{Tr. SS}$$

$$= 194,612.5 - 142,776.3$$

$$= 51,836.2$$

ค. Summary of ANOVA

Table 2 Analysis of variance (ANOVA) of CRD

SOV	df	SS	MS	F
Treatment	6	142,776.3	23,796.05	9.64**
Error	21	51,836.2	2,468.39	
Total	27	194,621.55		

ง. Coefficient of Variation (C.V.)

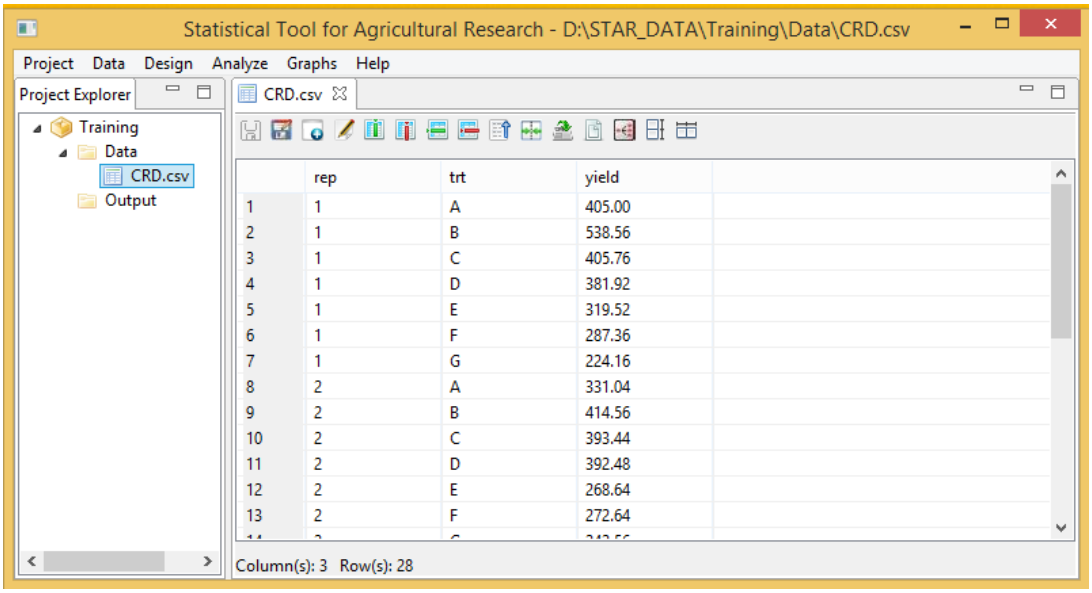
$$\text{C.V.} = \frac{\sqrt{\text{Error MS}}}{\text{GM}} \times 100$$

$$= \frac{\sqrt{2{,}468.39}}{325.99} \times 100$$

$$= 15.24$$

Analysis of Variance (ANOVA) of CRD using STAR

1. Import data of CRD.csv



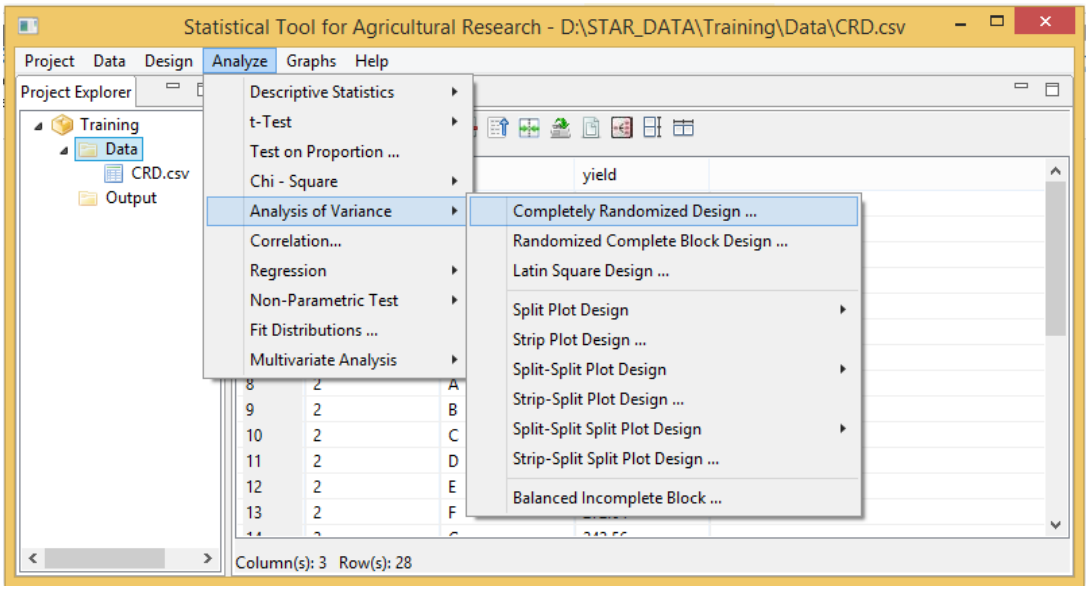
2. Analysis of Variance

2.1 From the Main Menu,

Analyze,

Analysis of Variance

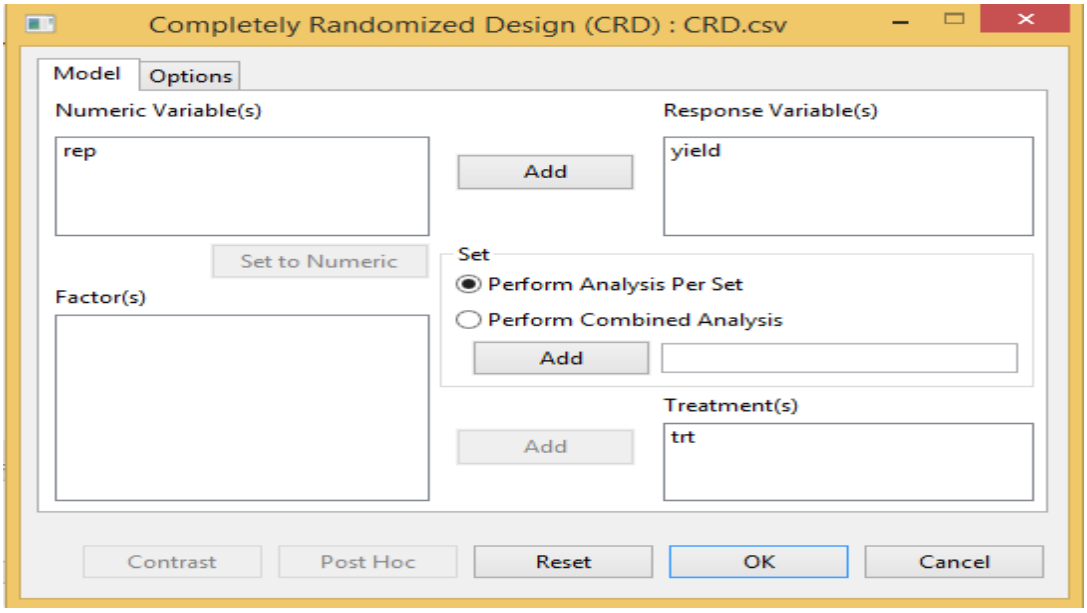
then Completely Randomize Design



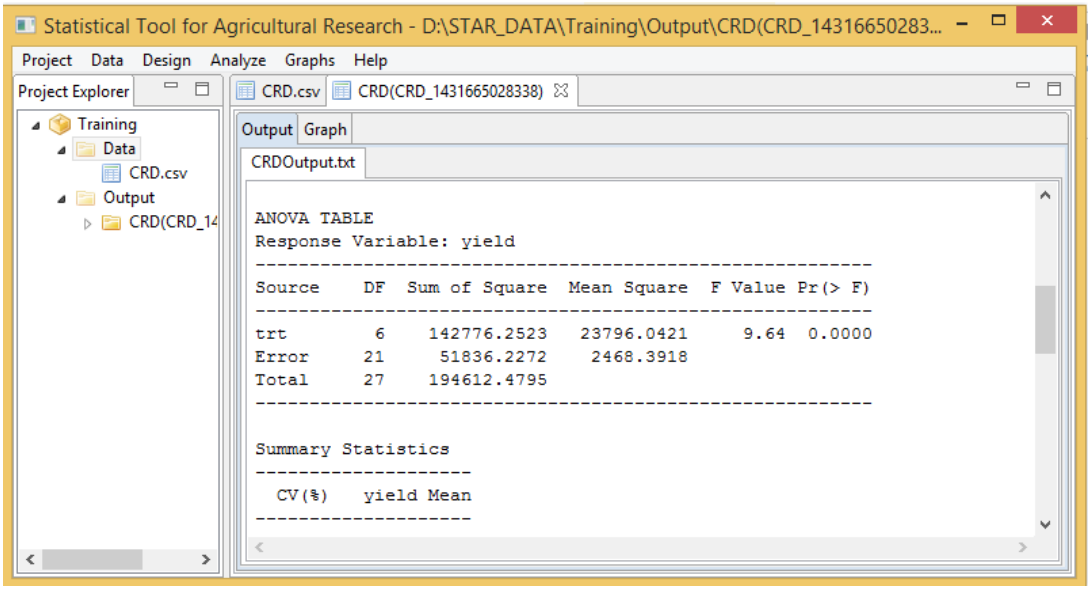
2.2 Making the Model

At Model Factor(s)

Click at trt then Add at the window of Treatment(s) then OK

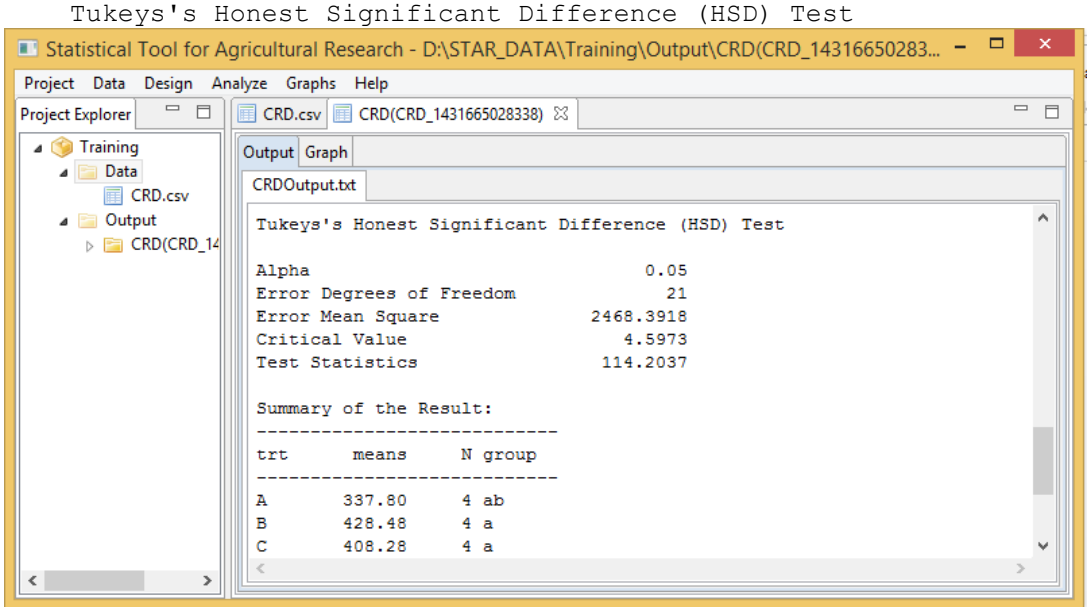


2.3 Result of Analysis of Variance (ANOVA)



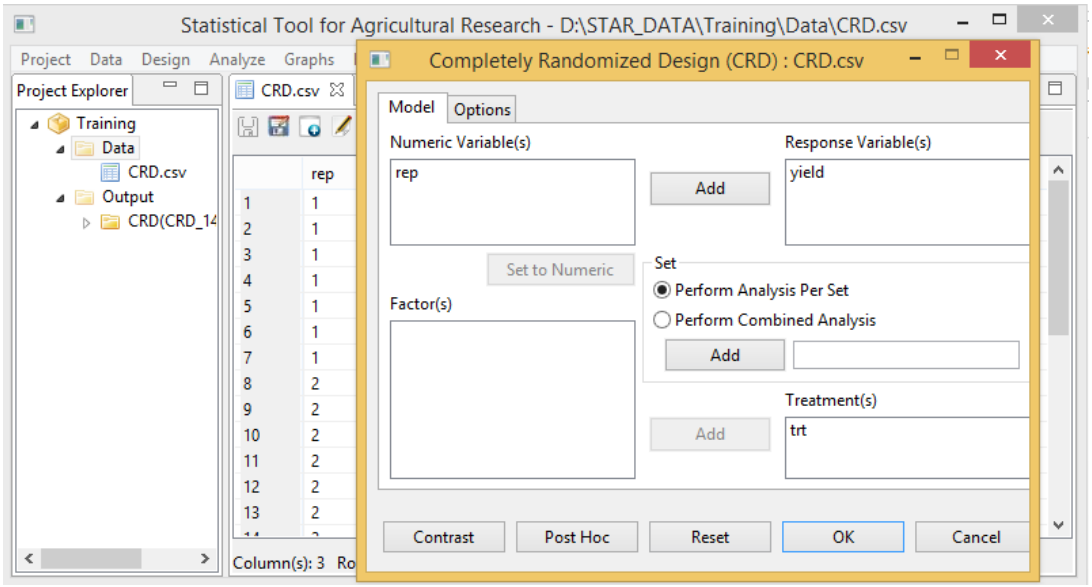
2.4 Analysis of Mean Comparison

Tukeys's Honest Significant Difference (HSD) Test



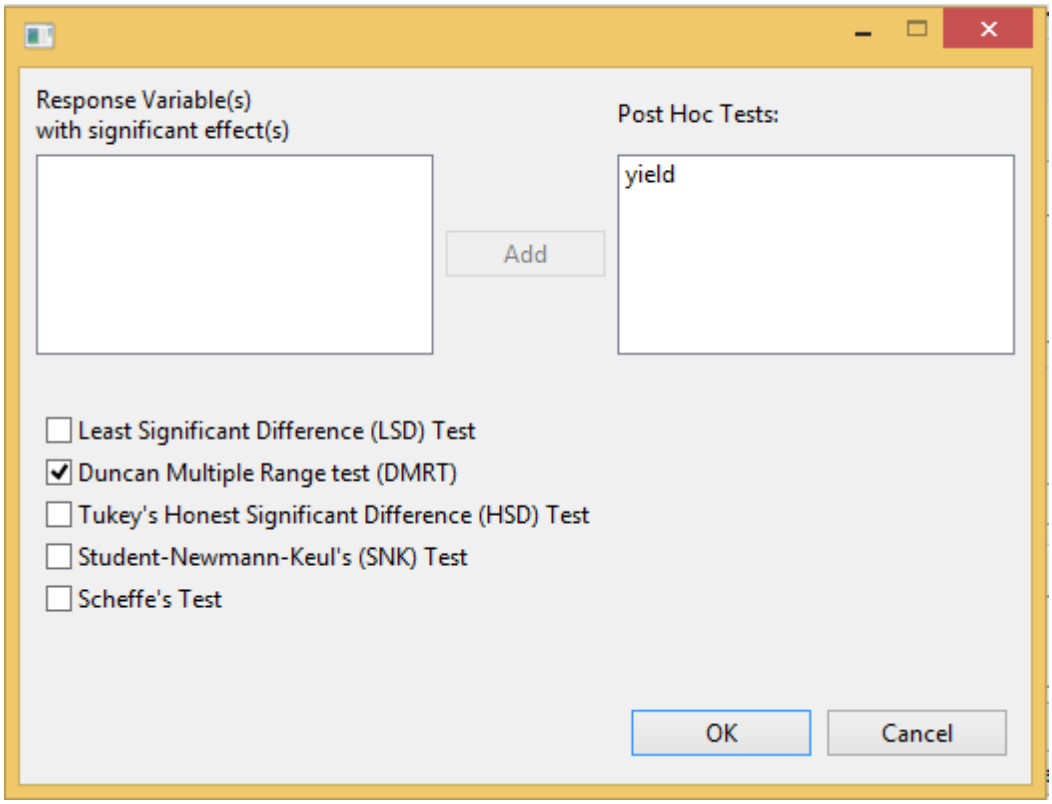
2.5 Mean comparison

At the PostHoc

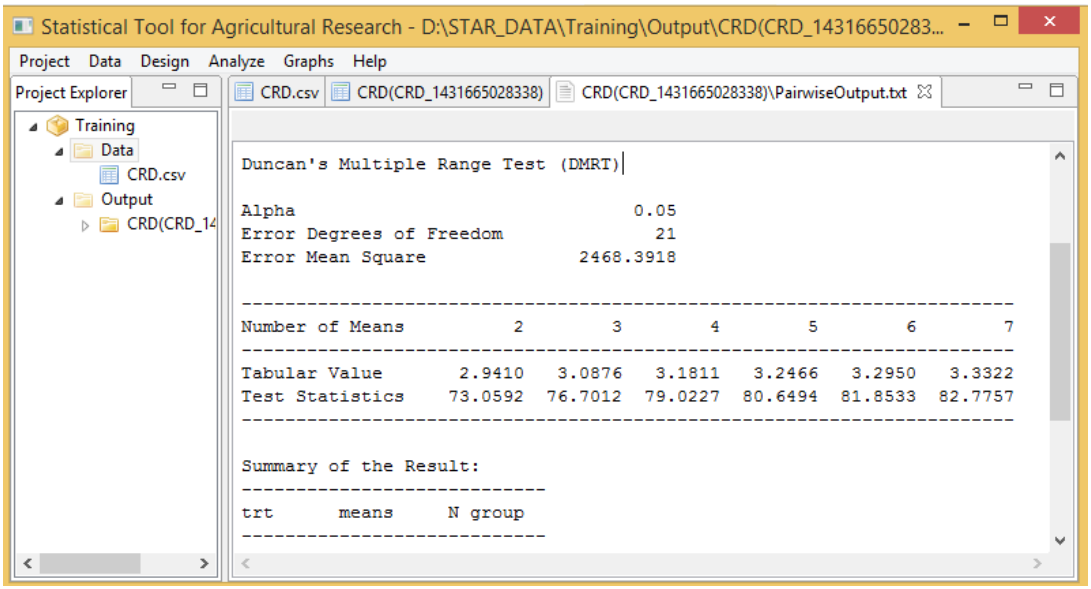


Click the PostHoc as picture below ===LSD, DMRT, HSD, SNK and Scheffe's Test

Post Hoc Tests:



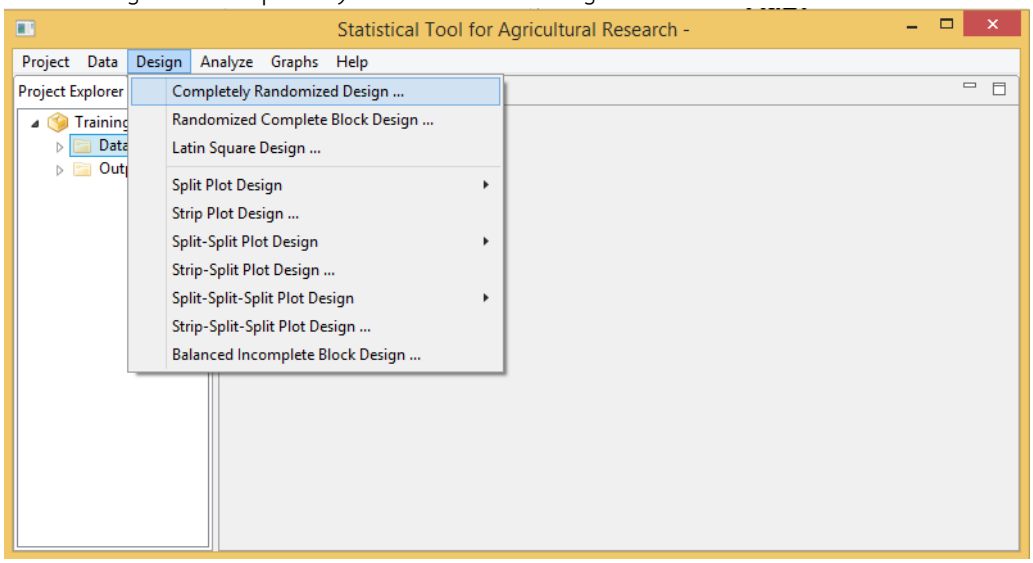
DMRT


Statistical Tool for Agricultural Research - D:\STAR_DATA\Training\Output\CRD(CRD_14316650283...
Project Data Design Analyze Graphs Help
Project Explorer
Training
Data
CRD.csv
Output
CRD(CRD_14
CRD.csv
CRD(CRD_1431665028338)
CRD(CRD_1431665028338)\PairwiseOutput.txt
Duncan's Multiple Range Test (DMRT)
Alpha 0.05
Error Degrees of Freedom 21
Error Mean Square 2468.3918
Number of Means 2 3 4 5 6 7
Tabular Value 2.9410 3.0876 3.1811 3.2466 3.2950 3.3322
Test Statistics 73.0592 76.7012 79.0227 80.6494 81.8533 82.7757
Summary of the Result:
trt means N group

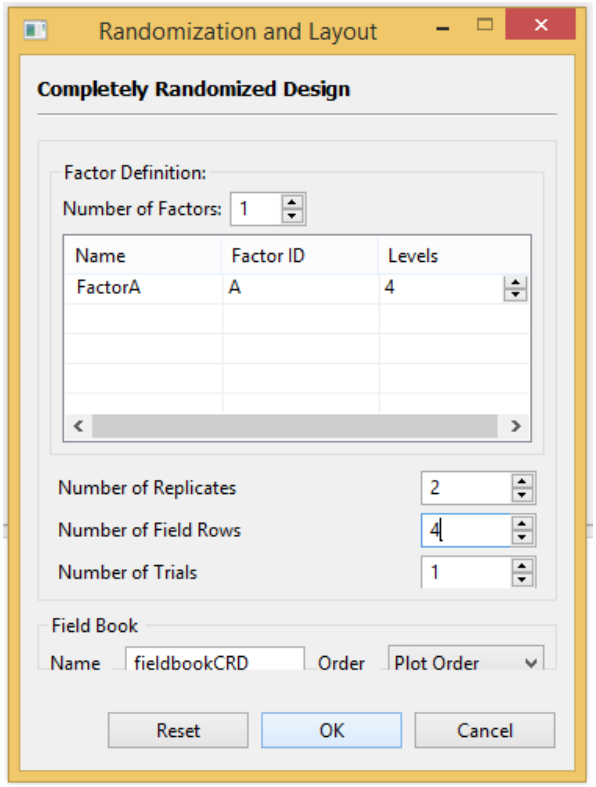
Randomization of CRD

1. At the windows of Design

Choosing the Completely Randomized Design



2. Having 4 treatments



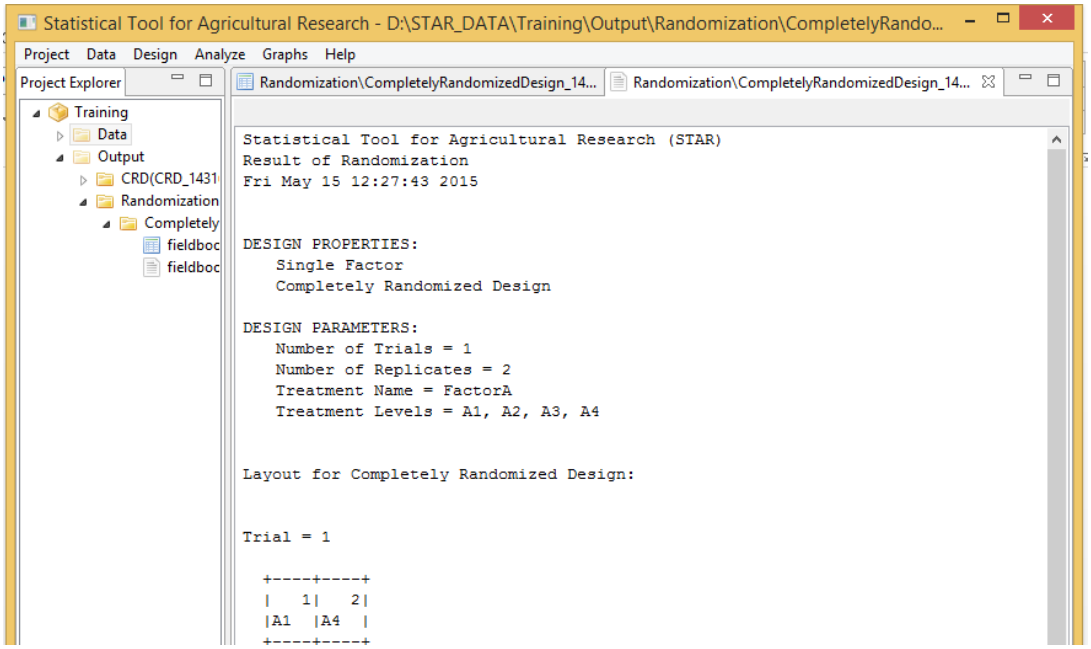
Number of Factors: 1 for CRD

Levels =4 trts

Number of Replications =2

Number of Field Rows =4

Number of Trials =1


Statistical Tool for Agricultural Research - D:\STAR_DATA\Training\Output\Randomization\CompletelyRando...
Project Data Design Analyze Graphs Help
Project Explorer
Training
Data
Output
CRD(CRD_1431
Randomization
Completely
fieldboc
fieldboc
Randomization\CompletelyRandomizedDesign_14...
Randomization\CompletelyRandomizedDesign_14...
Statistical Tool for Agricultural Research (STAR)
Result of Randomization
Fri May 15 12:27:43 2015
DESIGN PROPERTIES:
Single Factor
Completely Randomized Design
DESIGN PARAMETERS:
Number of Trials = 1
Number of Replicates = 2
Treatment Name = FactorA
Treatment Levels = A1, A2, A3, A4
Layout for Completely Randomized Design:
Trial = 1
+----+----+
| 1| 2|
|A1 |A4 |
+----+----+

Randomized Complete Block Design

Example 5 Growing the rice varieties, SPR 60 in RCB with different seed rates

Table 1 Grain yield (kg/rai) at 6 seed rates

Treatments	Block				T_j
(seed rates)	I	II	III	IV	
A (4 kg/rai)	818.08	863.68	849.12	748.48	3279.36
B (8 kg/rai)	855.36	952.32	755.04	682.24	3244.96
C (12 kg/rai)	843.52	914.08	877.28	759.84	3394.72
D (16 kg/rai)	826.24	772.96	797.76	705.60	3102.56
E (20 kg/rai)	768.64	775.68	709.12	759.68	3013.12
F (24 kg/rai)	840.64	726.72	787.04	655.68	3010.08
R_i	4,925.48	5,005.44	4,775.36	4,311.52	GT=19,044.80

ตารางที่ 2 ตารางวิเคราะห์ความแปรปรวนของแผนการทดลองแบบสุ่มในบลอคสมบูรณ์

SOV	**d.f.**	**SS**	**MS**	**F**
Replications	3	49,775.7	16,591.9	
Treatments	5	30,677.3	6,135.45	2.17
Error	15	42,454.4	2,830.30	
Total	23	122,907.0		

สรุปผลการวิเคราะห์

ค่า $F_{0.05\ (5,15)}$ จากตารางมีค่าเท่ากับ 3.106 จะเห็นได้ว่าค่า F ที่คำนวณได้ของทรีทเมนต์ มีค่าน้อยกว่า ดังนั้นจึงยอมรับสมมติฐานหลัก แสดงว่า การปลูกข้าวเมื่อใช้อัตราเมล็ดที่แตกต่างกัน ไม่มีผลต่อผลผลิตข้าว ดังนั้นจึงควรแนะนำให้เกษตรปลูกข้าวโดยใช้เมล็ดพันธุ์ที่ 4 กิโลกรัมต่อไร่

คำนวณ coefficient of variation

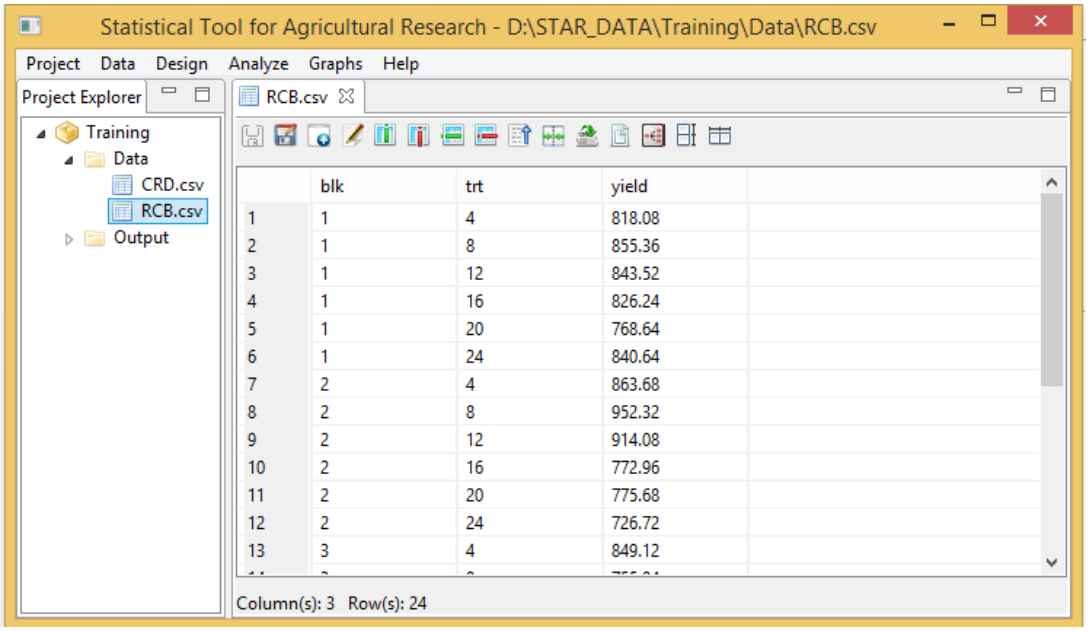
$$CV = \frac{\sqrt{Error.MS}}{Y_{..}/rt} x100$$

$$= \frac{\sqrt{2,830.30}}{4,761.20/(4)(6)} \times 100$$

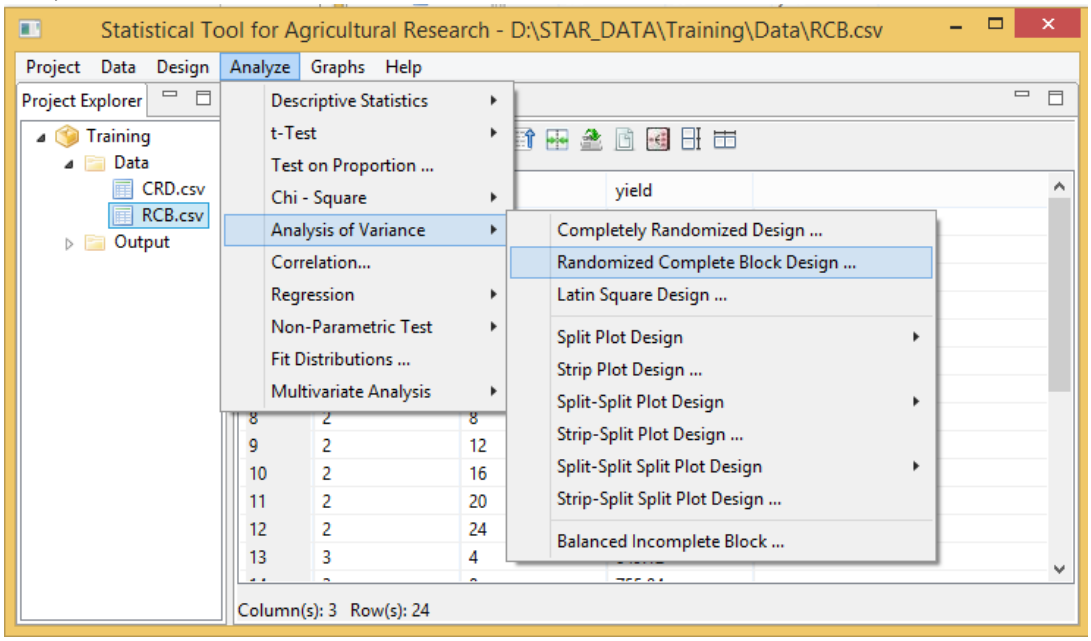
$$= 6.70\%$$

การวิเคราะห์ความแปรปรวนของการทดลองแบบสุ่มในบลอคสมบูรณ์ด้วย STAR-2.0.1

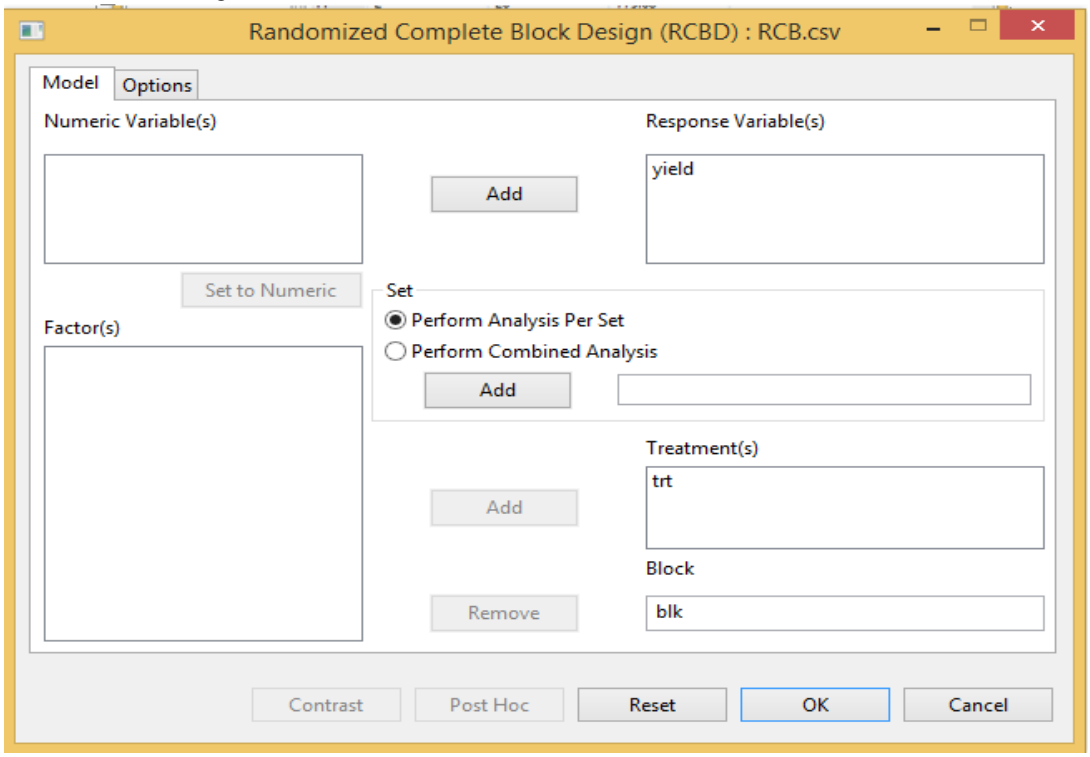
1. Import Data


Statistical Tool for Agricultural Research - D:\STAR_DATA\Training\Data\RCB.csv
Project
Data
Design
Analyze
Graphs
Help
Project Explorer
Training
Data
CRD.csv
RCB.csv
Output
RCB.csv
blk trt yield
1 1 4 818.08
2 1 8 855.36
3 1 12 843.52
4 1 16 826.24
5 1 20 768.64
6 1 24 840.64
7 2 4 863.68
8 2 8 952.32
9 2 12 914.08
10 2 16 772.96
11 2 20 775.68
12 2 24 726.72
13 3 4 849.12
Column(s): 3 Row(s): 24

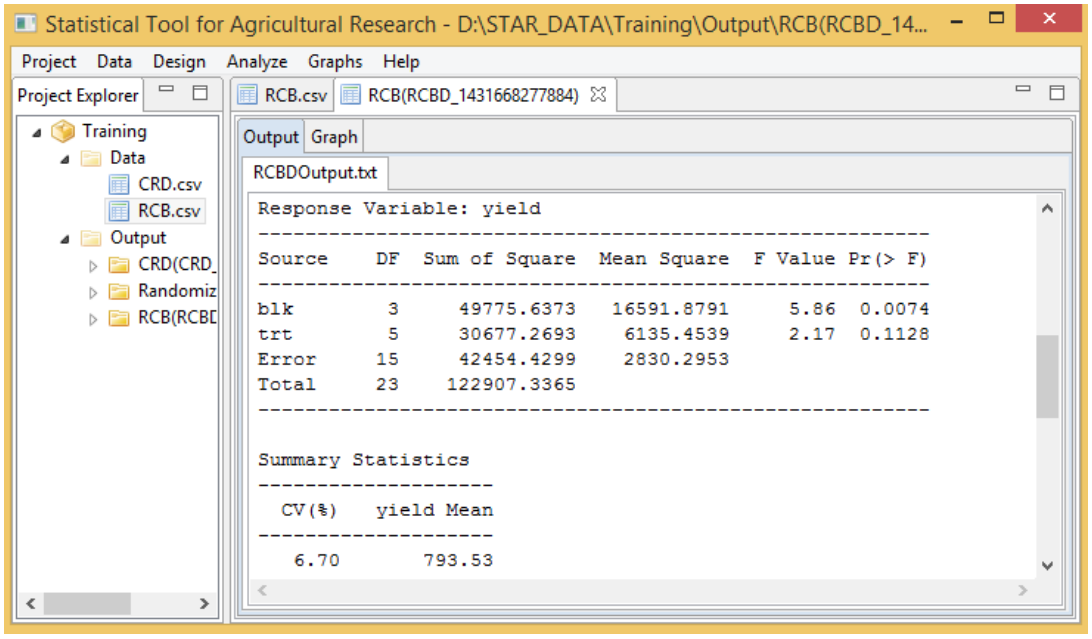
2. Analysis of Variance



2.1 Choosing the Model

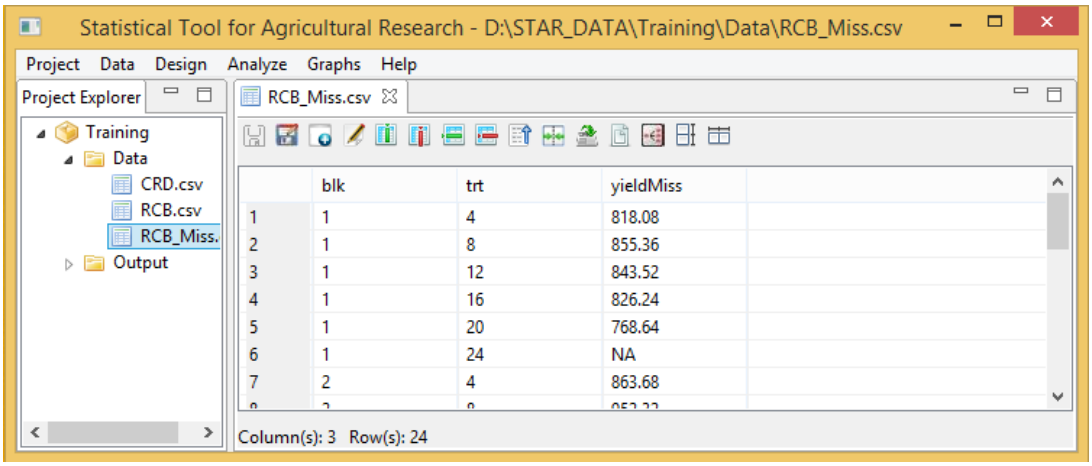


3. Results



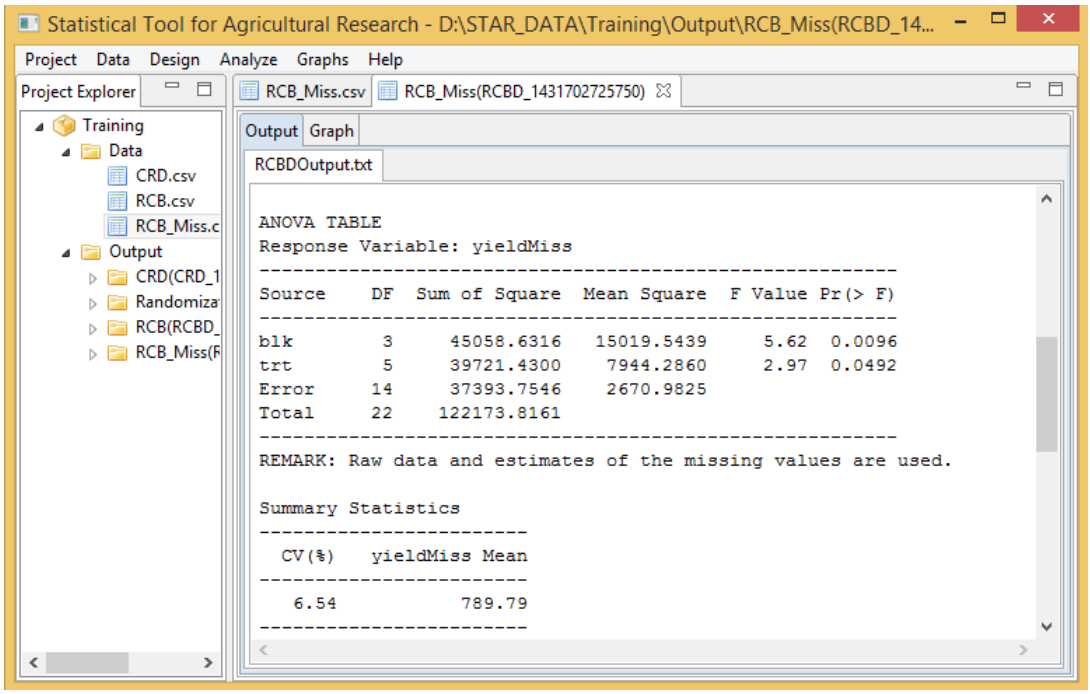
In the Missing Data

1. put the NA in the missing value



2. Result

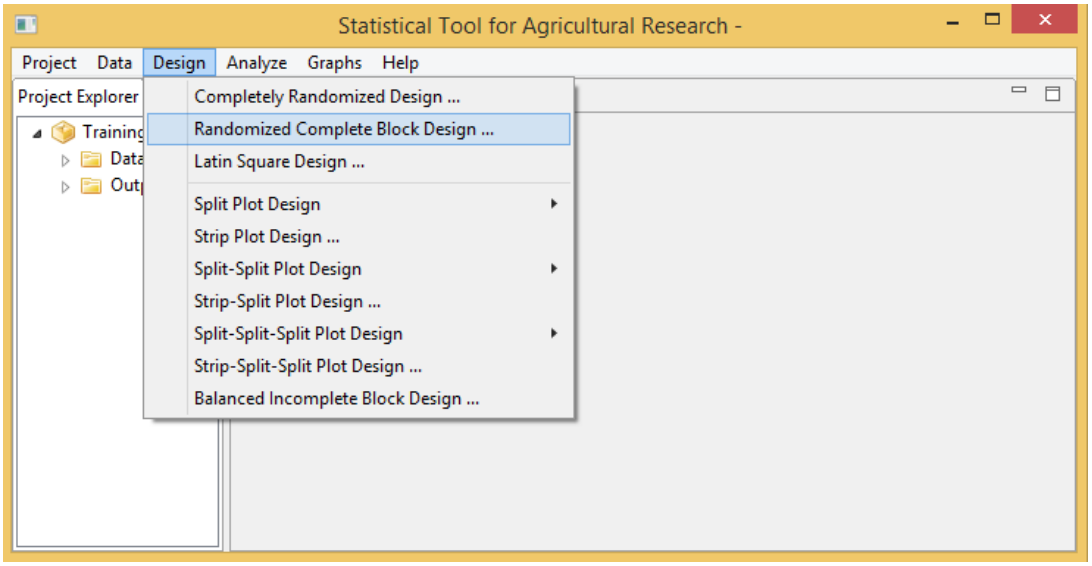
The DF of Error will reduce as missing value (df - missing value)



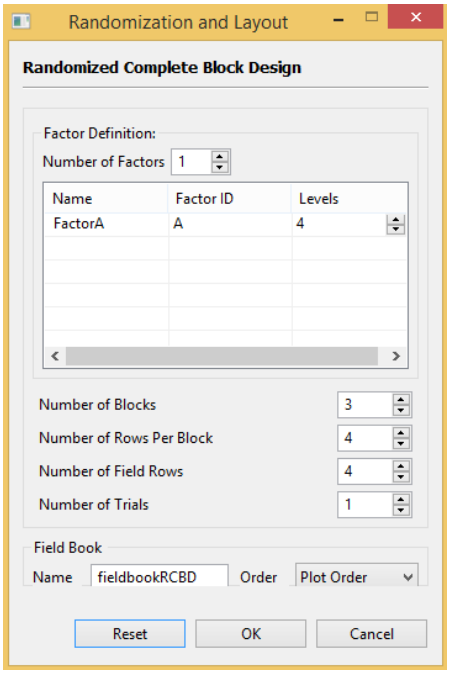
Randomization of RCBD

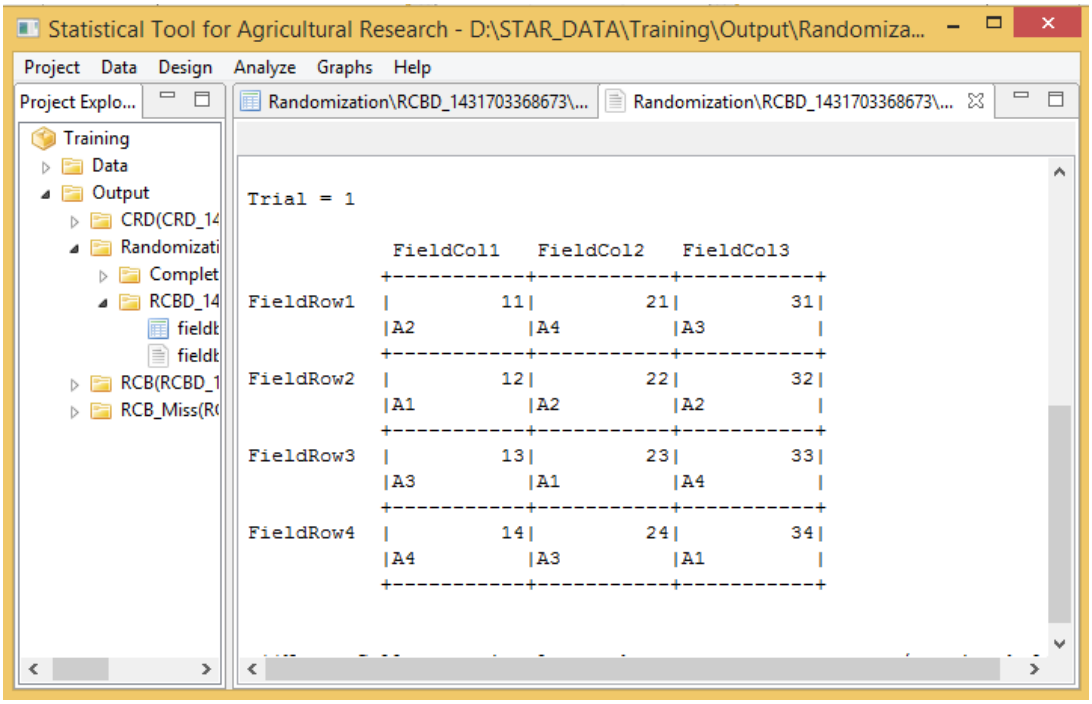
1. For example, using 4 treatments with 3 blocks

At the menu bar, choose the Design ---- Randomized Complete Block Design ดังภาพ



Then


Randomization and Layout
Randomized Complete Block Design
Factor Definition:
Number of Factors 1
Name
Factor ID
Levels
FactorA
A
4
Number of Blocks 3
Number of Rows Per Block 4
Number of Field Rows 4
Number of Trials 1
Field Book
Name fieldbookRCBD
Order Plot Order
Reset
OK
Cancel


Statistical Tool for Agricultural Research - D:\STAR_DATA\Training\Output\Randomiza...
Project Data Design Analyze Graphs Help
Project Explo...
Training
Data
Output
Randomization\RCBD_1431703368673\...
Randomization\RCBD_1431703368673\...
Trial = 1
FieldCol1 FieldCol2 FieldCol3
FieldRow1 | 11| 21| 31|
|A2 |A4 |A3 |
FieldRow2 | 12| 22| 32|
|A1 |A2 |A2 |
FieldRow3 | 13| 23| 33|
|A3 |A1 |A4 |
FieldRow4 | 14| 24| 34|
|A4 |A3 |A1 |

Factorial Experiment

Example…. Growing the corn (V) of 2 variety (ETH3 (v_0) and ETH7 (v_1)) at Temperature (T) 3 levels 10 (t_0) 15 (t_1) and 20 (t_2) degree Celsius (C) with 4 replications in the completely randomized design (CRD) at the age of 1 month, dry weight were collected.

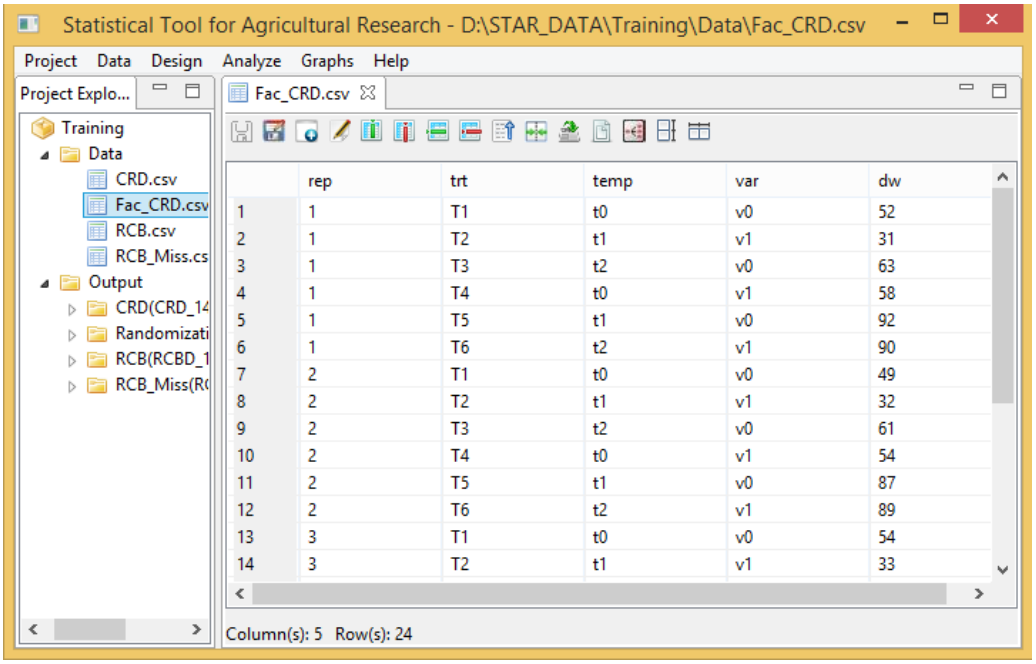
Table 1 Dry weight (g/plant)

Treatments	Dry weight (g/p)				Sum
	I	II	III	IV	
T1 = t_0v_0	52	49	54	55	210
T2 = t_1v_1	31	32	33	37	133
T3 = t_2v_0	63	61	65	70	259
T4 = t_0v_1	58	54	59	56	227
T5 = t_1v_0	92	87	96	99	374
T6 = t_2v_1	90	89	97	94	370
Sum					1,573

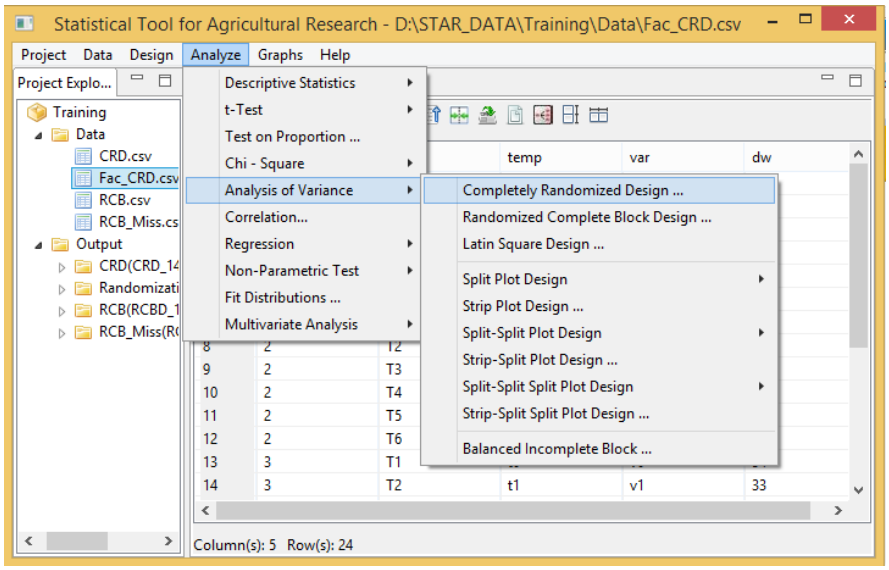
Table ANOVA

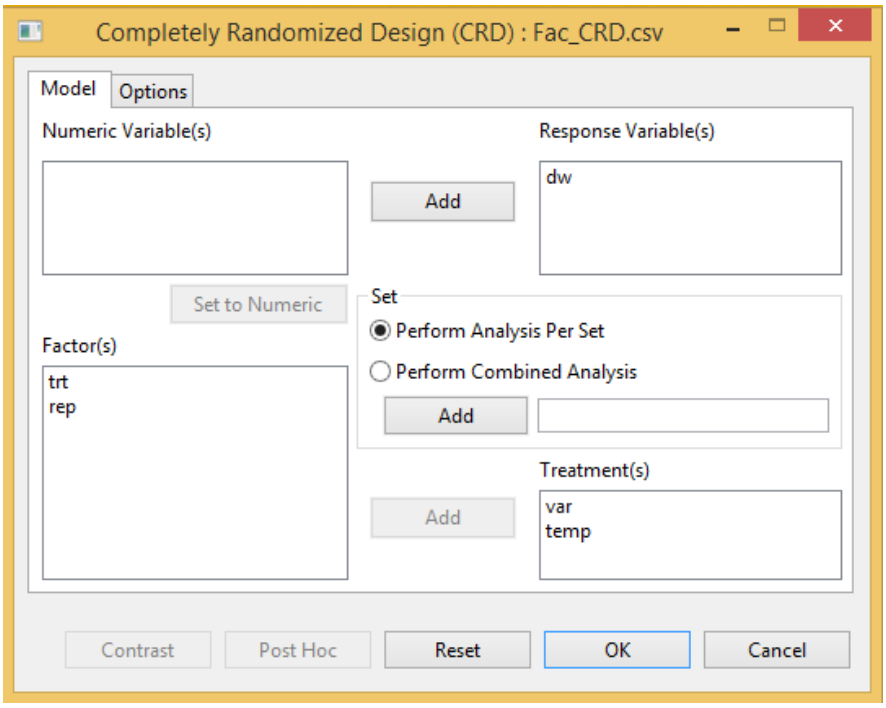
SOV	df	SS	MS	F
Treatment	5	11,196.7	2,239.34	180.59**
Temperature (T)	2	2,360.33	1,180.17	95.175**
Varieties (V)	1	532.04	532.04	42.907**
V x T	2	8,304.33	4,152.17	334.852**
Error	18	223.26	12.40	
Total	23	11,419.96		

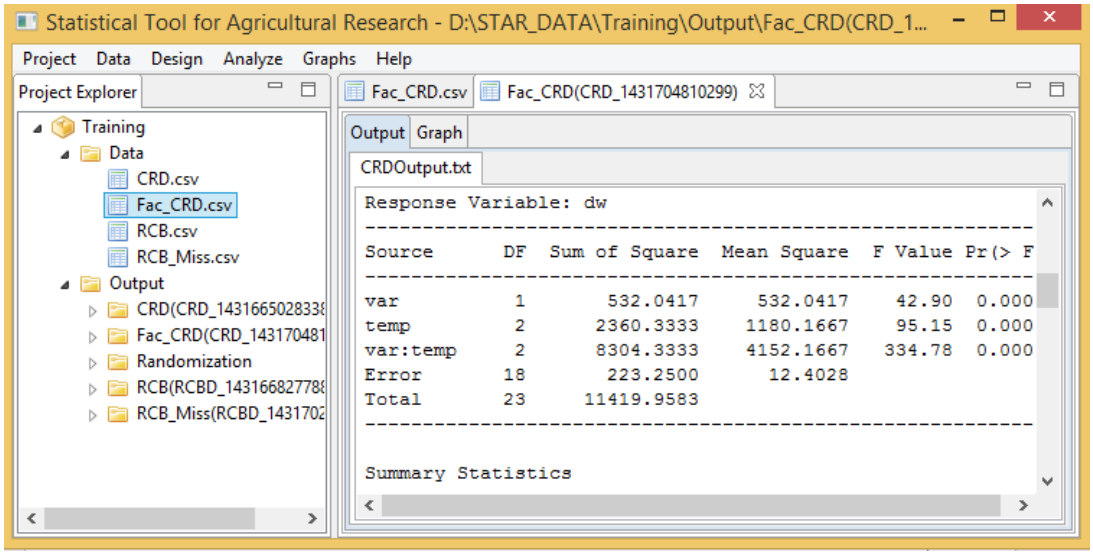
1. Import Data



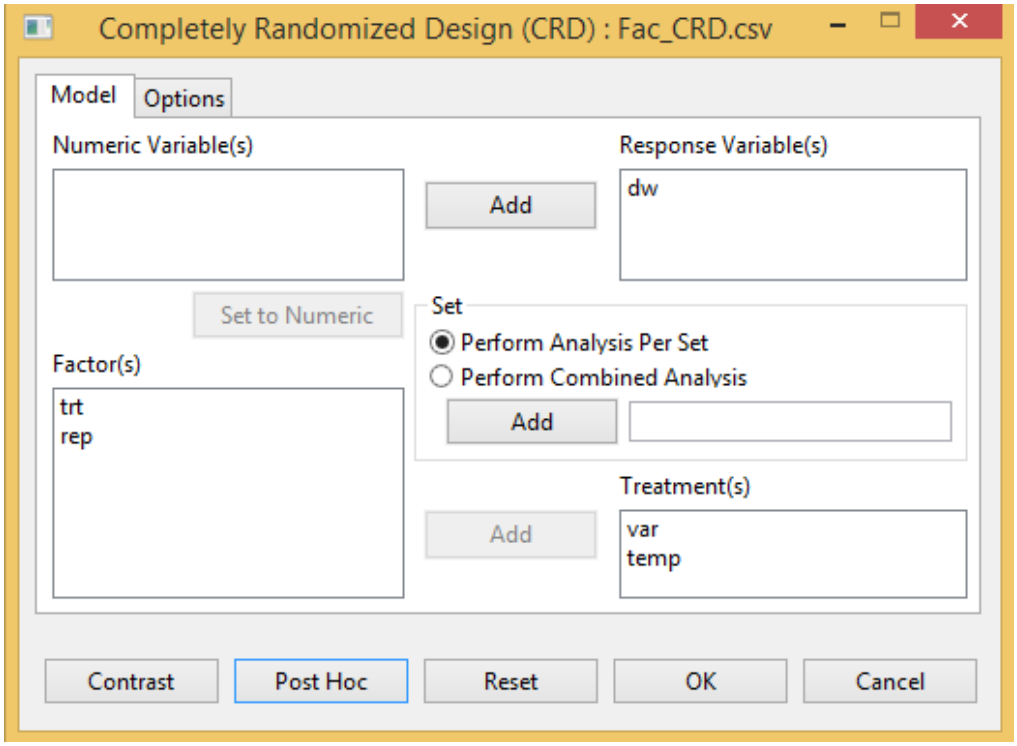
2. Analysis



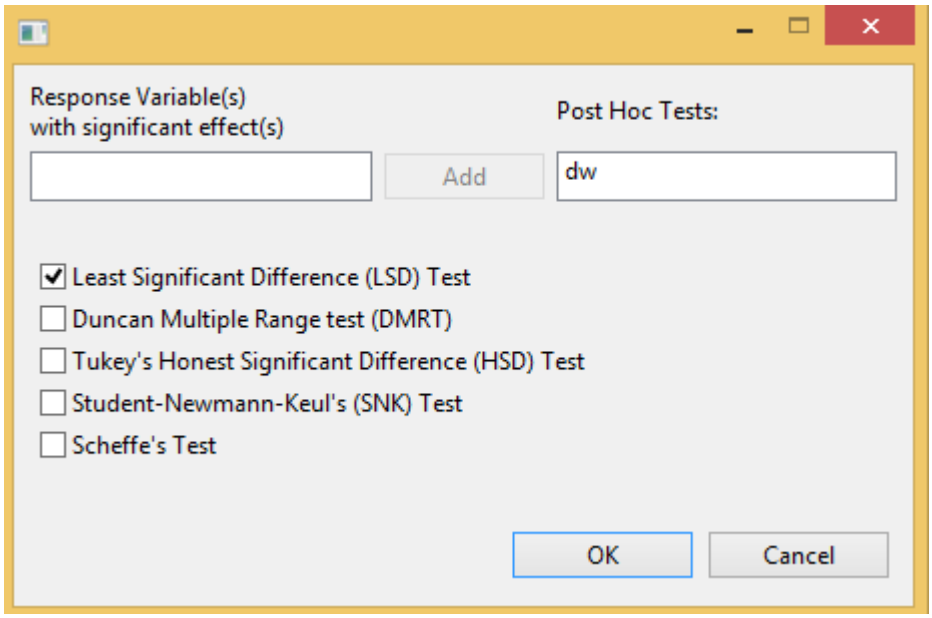


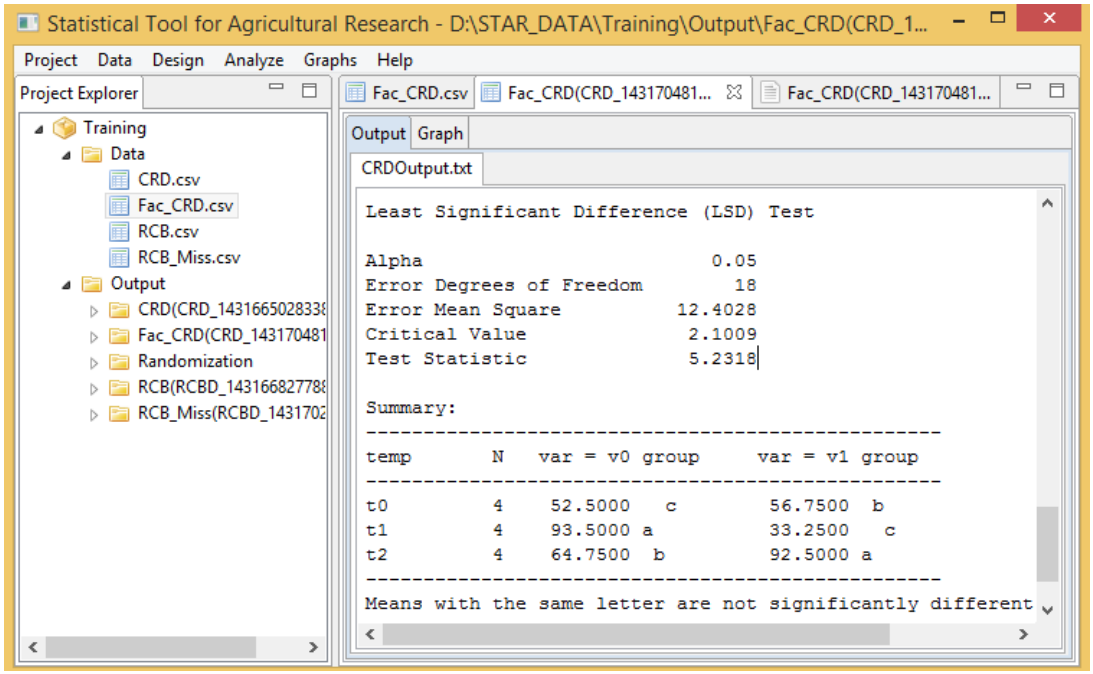


3. Mean Comparison



Post Hoc then OK




Statistical Tool for Agricultural Research - D:\STAR_DATA\Training\Output\Fac_CRD(CRD_1...
Project Data Design Analyze Graphs Help
Project Explorer
Training
Data
CRD.csv
Fac_CRD.csv
RCB.csv
RCB_Miss.csv
Output
CRD(CRD_1431665028338
Fac_CRD(CRD_143170481
Randomization
RCB(RCBD_143166827788
RCB_Miss(RCBD_1431702
Fac_CRD.csv
Fac_CRD(CRD_143170481...
Fac_CRD(CRD_143170481...
Output
Graph
CRDOutput.txt
Least Significant Difference (LSD) Test
Alpha 0.05
Error Degrees of Freedom 18
Error Mean Square 12.4028
Critical Value 2.1009
Test Statistic 5.2318
Summary:
temp N var = v0 group var = v1 group
t0 4 52.5000 c 56.7500 b
t1 4 93.5000 a 33.2500 c
t2 4 64.7500 b 92.5000 a
Means with the same letter are not significantly different

Randomization of Factorial in CRD using STAR-2.0.1

Factorial in CRD having 2 factors; 2 varieties and 3 rates of fertilizer, with 2 replications

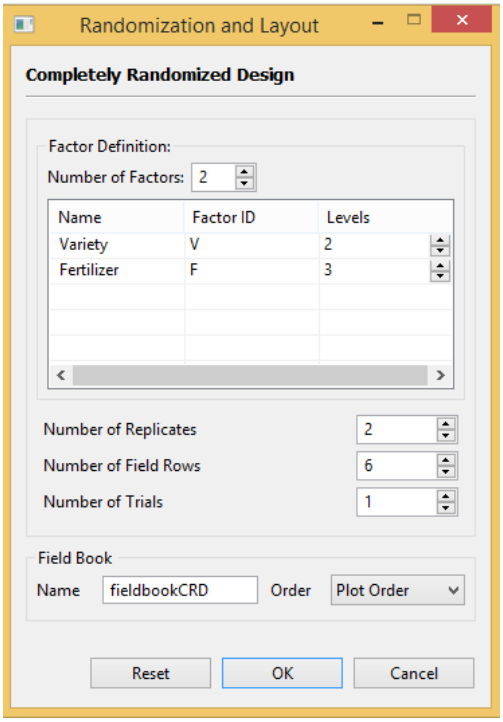
From Randomization and Layout windows

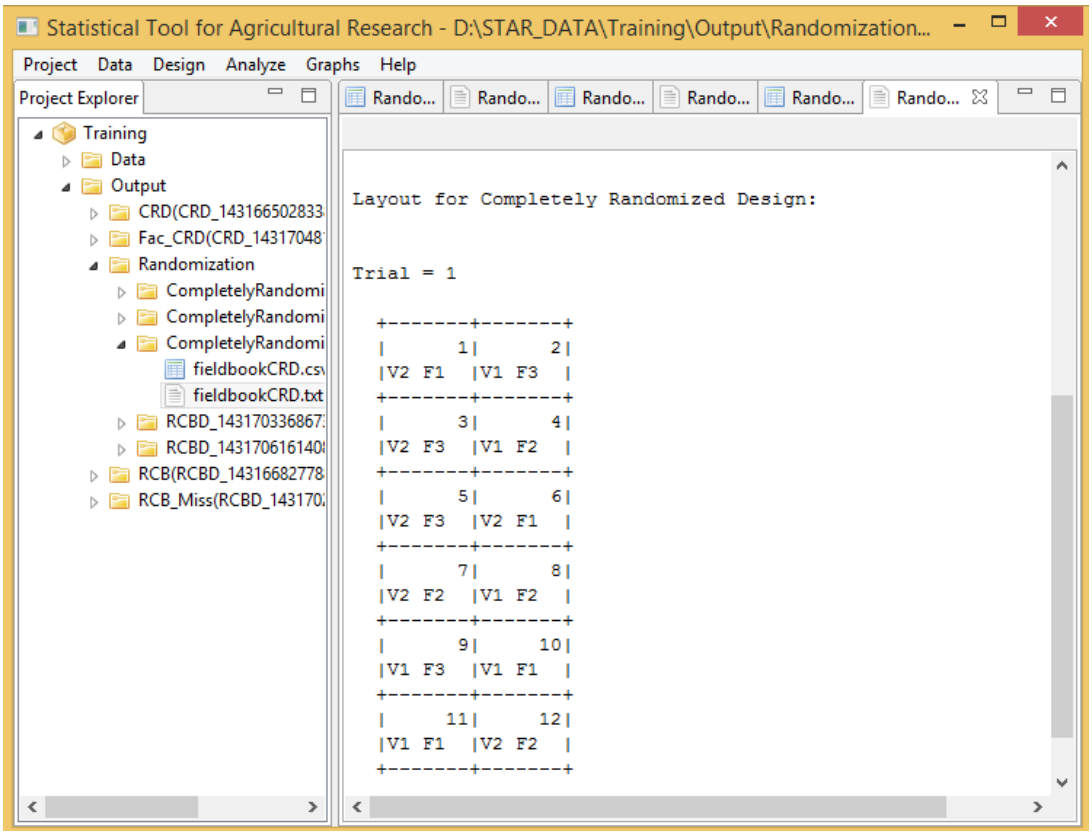
Number of Factors = 2

Name; Variety and Fertilizer

Factor ID; V and F

Levels = no. of levels in each factor




Statistical Tool for Agricultural Research - D:\STAR_DATA\Training\Output\Randomization...
Project Data Design Analyze Graphs Help
Project Explorer
Training
Data
Output
CRD(CRD_143166502833
Fac_CRD(CRD_14317048
Randomization
CompletelyRandomi
CompletelyRandomi
CompletelyRandomi
fieldbookCRD.csv
fieldbookCRD.txt
RCBD_143170336867
RCBD_143170616140
RCB(RCBD_14316682778
RCB_Miss(RCBD_143170
Rando...
Rando...
Rando...
Rando...
Rando...
Rando...
Layout for Completely Randomized Design:
Trial = 1
+-------+-------+
| 1| 2|
|V2 F1 |V1 F3 |
+-------+-------+
| 3| 4|
|V2 F3 |V1 F2 |
+-------+-------+
| 5| 6|
|V2 F3 |V2 F1 |
+-------+-------+
| 7| 8|
|V2 F2 |V1 F2 |
+-------+-------+
| 9| 10|
|V1 F3 |V1 F1 |
+-------+-------+
| 11| 12|
|V1 F1 |V2 F2 |
+-------+-------+

Factorial in RCBD

Example.. Corn (A) 3 varieties; SW 1 (v_1) SW 3 (v_2) SW 5 (v_3)

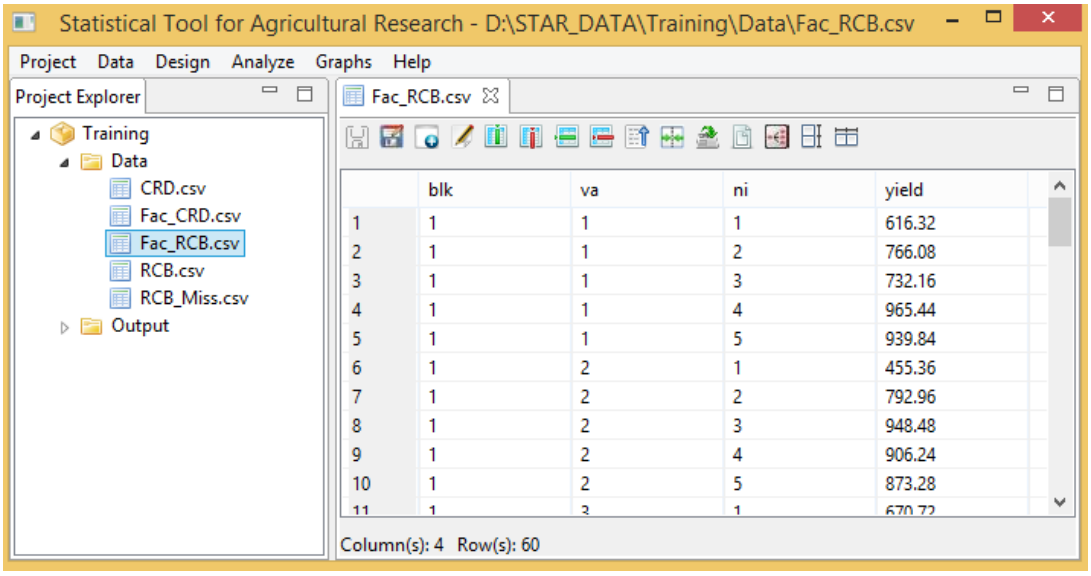
Fertilizer (B) 5 levels 0(n_o), 10(n_1), 20(n_2), 30(n_3) and 40(n_4) kg/rai

Table.. Grain yield of corn at different fertilizer applications

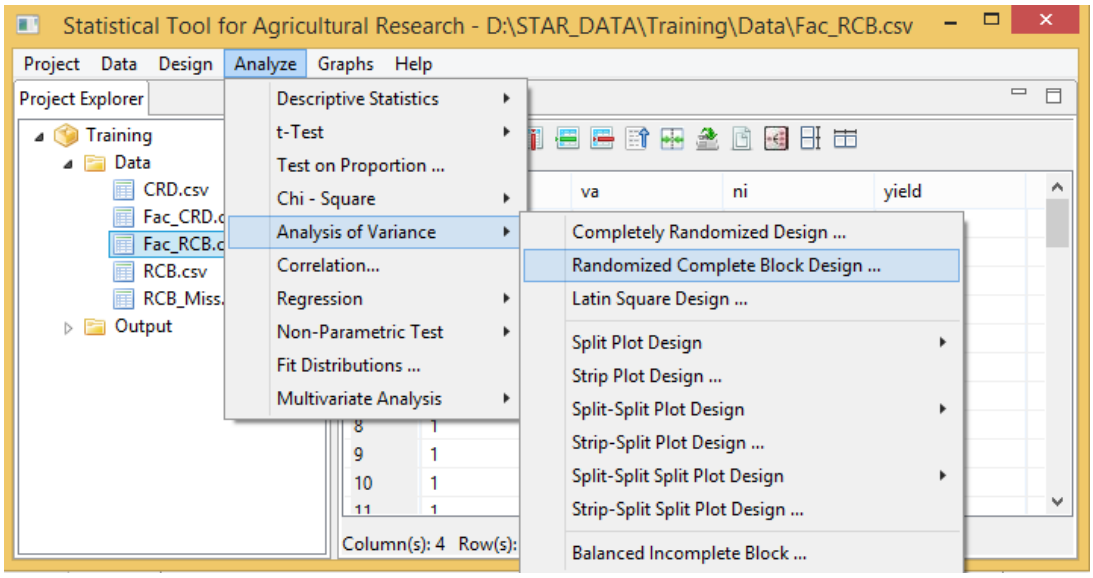
Fertilizer	Blocks					
(กก./ไร่)	I	II	III	IV	Sum	Mean
			v_1			
n_0 (0)	616.32	416.96	503.04	463.04	1,999.36	
n_1 (10)	766.08	789.76	729.92	737.28	3,023.04	
n_2 (20)	732.16	712.64	781.44	627.84	2,854.08	
n_3 (30)	965.44	844.16	944.96	904.32	3,658.88	
n_4 (40)	939.84	946.56	957.44	882.88	3,726.72	15,268.08
			v_2			
n_0	455.36	607.04	657.28	551.04	2,270.72	
n_1	792.96	820.48	664.00	798.40	3,075.84	
n_2	948.48	911.68	929.60	689.28	3,479.04	
n_3	906.24	857.92	1,033.28	875.84	3,673.28	
n_4	873.28	887.36	925.76	949.12	3,635.52	16,134.40
			v_3			
n_0	670.72	600.64	598.08	548.48	2,417.92	
n_1	840.00	733.12	783.36	685.76	3,042.24	
n_2	931.52	775.68	908.48	789.12	3,404.80	
n_3	942.08	883.84	966.72	760.96	3,553.60	
n_4	938.24	1,002.24	968.96	857.92	3,763.36	16,185.92
Sum	12,318.72	11,790.08	12,352.32	11,121.28		
Grand Total						47,582.40

Factorial in RCBD with STAR

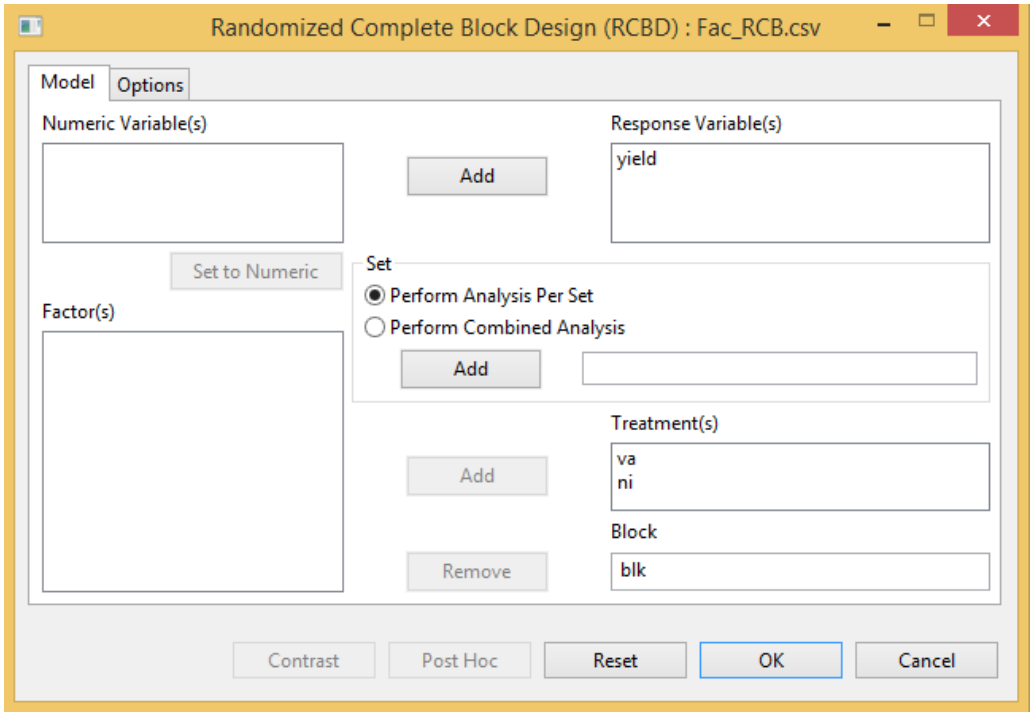
1. Import Data



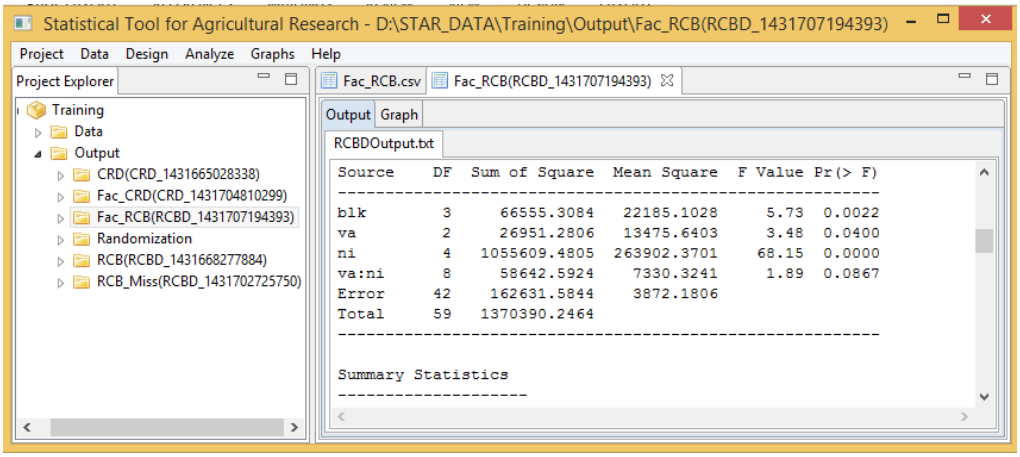
2. Analysis



2. Model


Randomized Complete Block Design (RCBD) : Fac_RCB.csv
Model
Options
Numeric Variable(s)
Add
Response Variable(s)
yield
Set to Numeric
Set
Perform Analysis Per Set
Perform Combined Analysis
Factor(s)
Add
Treatment(s)
va
ni
Add
Block
Remove
blk
Contrast
Post Hoc
Reset
OK
Cancel

3. Result


Statistical Tool for Agricultural Research - D:\STAR_DATA\Training\Output\Fac_RCB(RCBD_1431707194393)
Project Data Design Analyze Graphs Help
Project Explorer
Training
Data
Output
CRD(CRD_1431665028338)
Fac_CRD(CRD_1431704810299)
Fac_RCB(RCBD_1431707194393)
Randomization
RCB(RCBD_1431668277884)
RCB_Miss(RCBD_1431702725750)
Fac_RCB.csv
Fac_RCB(RCBD_1431707194393)
Output
Graph
RCBDOutput.txt
Source DF Sum of Square Mean Square F Value Pr(> F)
blk 3 66555.3084 22185.1028 5.73 0.0022
va 2 26951.2806 13475.6403 3.48 0.0400
ni 4 1055609.4805 263902.3701 68.15 0.0000
va:ni 8 58642.5924 7330.3241 1.89 0.0867
Error 42 162631.5844 3872.1806
Total 59 1370390.2464
Summary Statistics

Regression and Correlation Analysis

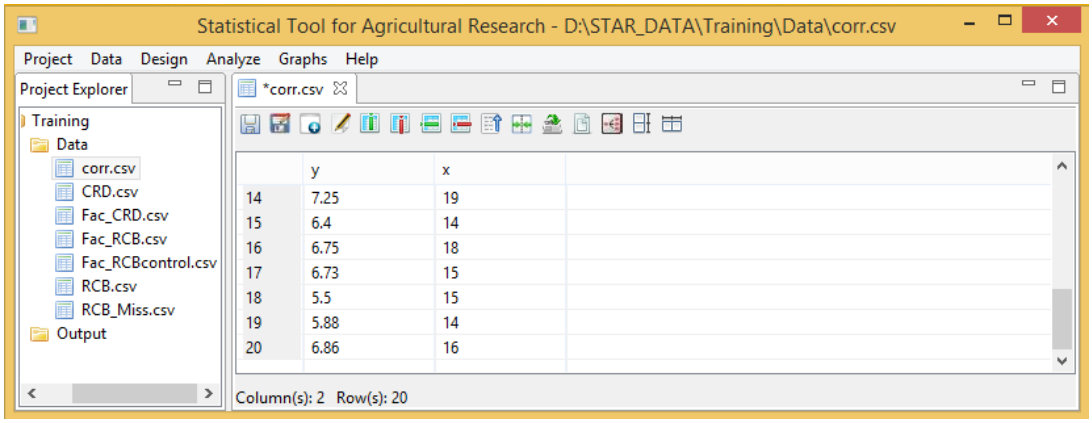
Example. Tilling capacity of 20 rice and grain yield (y) (kg/ha)

Variety	1	2	3	4	5	6	7	8	9	10	11	12	13	14
y	5.6	5.75	7.92	6.9	5.81	7.46	6.01	5.9	7.86	6.33	6.95	6.56	6.54	7.25
x	13	14	19	18	14	19	15	16	19	17	18	17	18	19

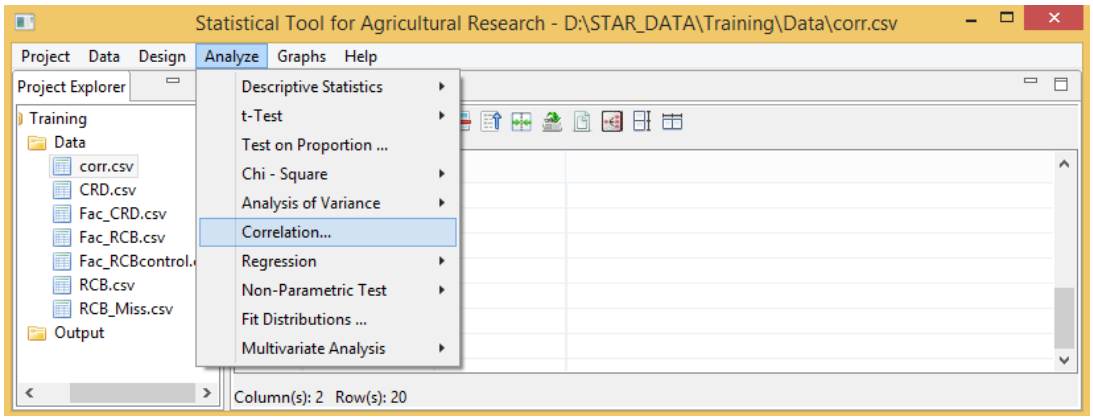
พันธุ์	15	16	17	18	19	20
y	6.4	6.75	6.73	5.5	5.88	6.86
x	14	18	15	15	14	16

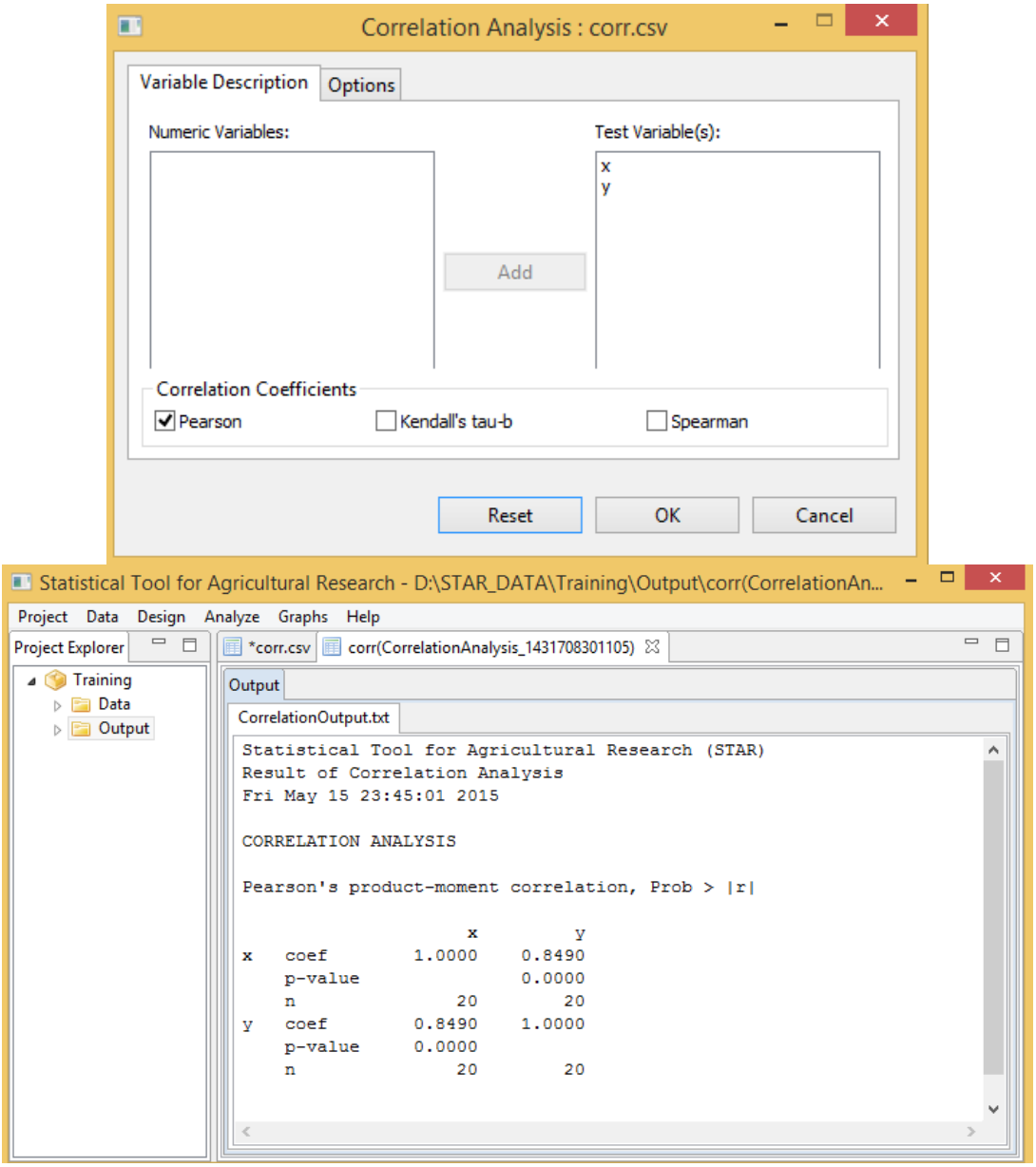
Correlation (r) using STAR

1. Import Data



2. Analysis



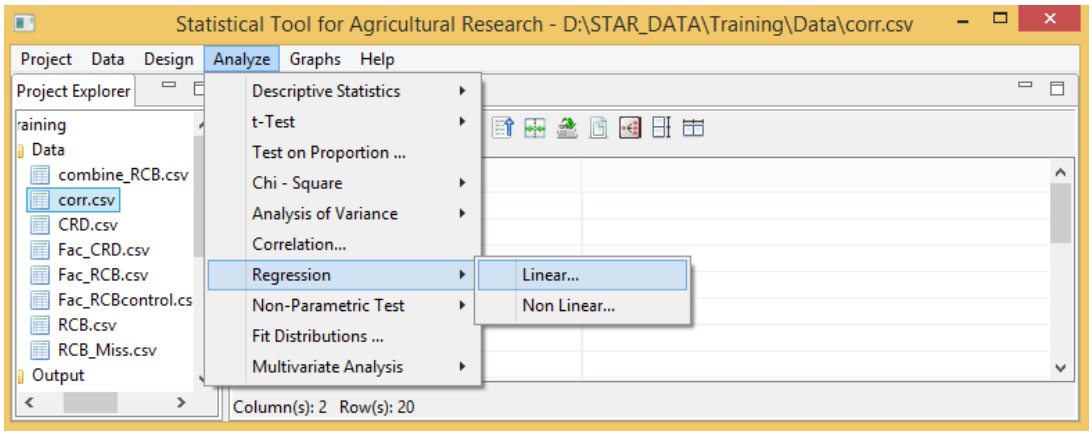

Correlation Analysis : corr.csv
Variable Description
Options
Numeric Variables:
Test Variable(s):
x
y
Add
Correlation Coefficients
Pearson
Kendall's tau-b
Spearman
Reset
OK
Cancel
Statistical Tool for Agricultural Research - D:\STAR_DATA\Training\Output\corr(CorrelationAn...
Project
Data
Design
Analyze
Graphs
Help
Project Explorer
Training
Data
Output
*corr.csv
corr(CorrelationAnalysis_1431708301105)
Output
CorrelationOutput.txt
Statistical Tool for Agricultural Research (STAR)
Result of Correlation Analysis
Fri May 15 23:45:01 2015
CORRELATION ANALYSIS
Pearson's product-moment correlation, Prob > |r|
x coef 1.0000 0.8490
p-value 0.0000
n 20 20
y coef 0.8490 1.0000
p-value 0.0000
n 20 20

Regression using STAR

Y = dependence variable

X = independence variable

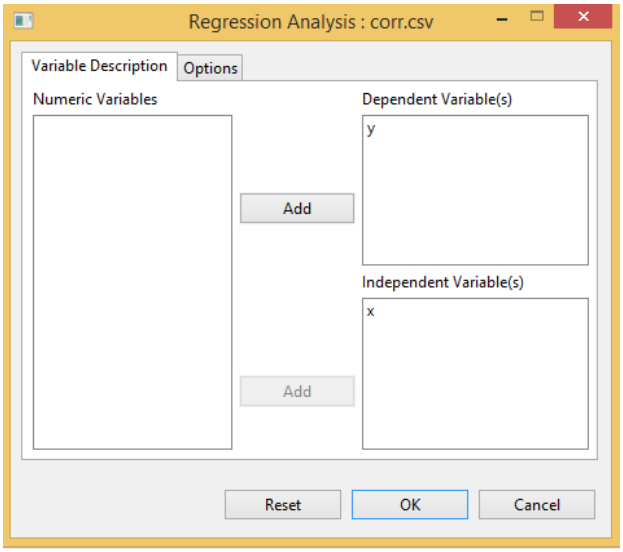
Analyze, Regression, then Linear



Regression Analysis

Variable Description

Dependent Variable(s)



Results

Output Graph

LinearRegOutput.txt

```
Statistical Tool for Agricultural Research (STAR)
Sat May 16 08:58:25 2015

Descriptive Statistics
-----------------------------------------------------
Variable     N_NonMissObs     Mean    StdDev    SE_Mean
-----------------------------------------------------
y                      20     6.55      0.72     0.1601
x                      20    16.40      2.04     0.4554
-----------------------------------------------------
```

Output Graph

LinearRegOutput.txt

```
LINEAR REGRESSION ANALYSIS
Model Fitted:  y ~ x

Analysis of Variance Table
-----------------------------------------------------------
Source    DF  Sum of Square  Mean Square  F Value Pr(> F)
-----------------------------------------------------------
Model      1         7.0202       7.0202    46.49  0.0000
Error     18         2.7182       0.1510
Total     19         9.7384
-----------------------------------------------------------

Model Summary:
-------------------------------------------------
  Root MSE   y Mean   CV(%)   R-Square   Adj R-Sq
-------------------------------------------------
    0.3886     6.55   10.93     0.7209     0.7054
-------------------------------------------------

Parameter Estimates:
-----------------------------------------------------------
Variable      Estimate   Std. Error   t value   Pr(>|t|)
-----------------------------------------------------------
Intercept         1.65       0.7232      2.29     0.0344
x                 0.30       0.0438      6.82     0.0000
-----------------------------------------------------------
```

Parameter Estimates ; Y=1.65 + 0.3X