GOVERNMENT OF
WESTERN AUSTRALIA

Department of
Primary Industries and
Regional Development

SAGI
Statistics for the Australian Grains Industry
National | North | West | South

Analysing Trial Results

Andrew van Burgel

Applied Statistician / Biometrician

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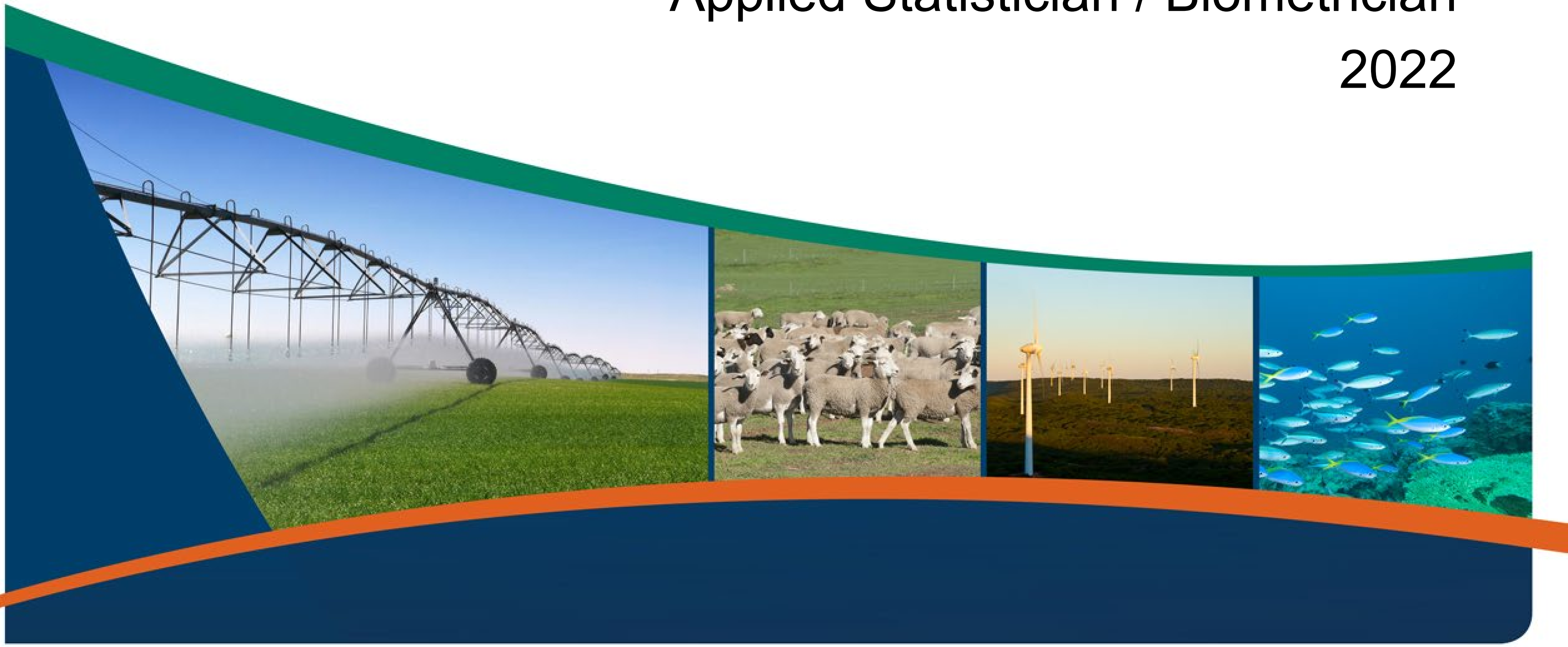


Example dataset

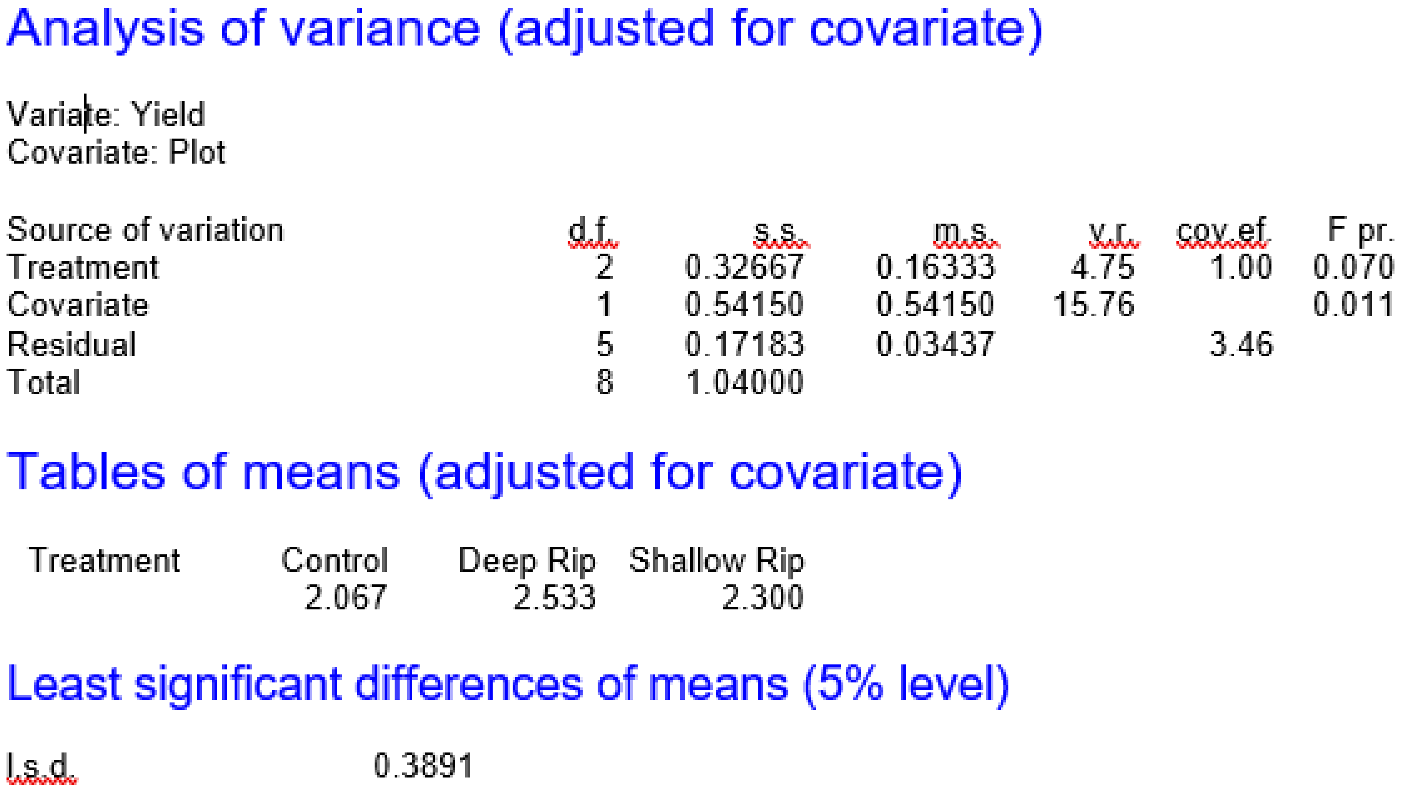
- **Treatments: Deep rip (DR), Shallow rip (SR), Nil Control (Nil)**

Analysis

- **ANOVA – Analysis of Variance**
  - Objective tool for assessing treatment differences
  - Gives a p-value – probability value related to treatments:
    - $p<0.05$ indicating >95% confidence that treatment effects are real
- **Software options:**
  - Genstat – best tool, but there is an annual licence (maybe about $1000)
  - R – free, but not so easy to use
  - Excel – unable to do what is required

Analysis in Genstat

- Demonstration…
- Output:



Analysis of variance (adjusted for covariate)

```
Variate: Yield
Covariate: Plot

Source of variation          d.f.       s.s.       m.s.     v.r.   cov.ef.   F pr.
Treatment                      2     0.32667    0.16333     4.75     1.00    0.070
Covariate                      1     0.54150    0.54150    15.76             0.011
Residual                       5     0.17183    0.03437              3.46
Total                          8     1.04000
```

Tables of means (adjusted for covariate)

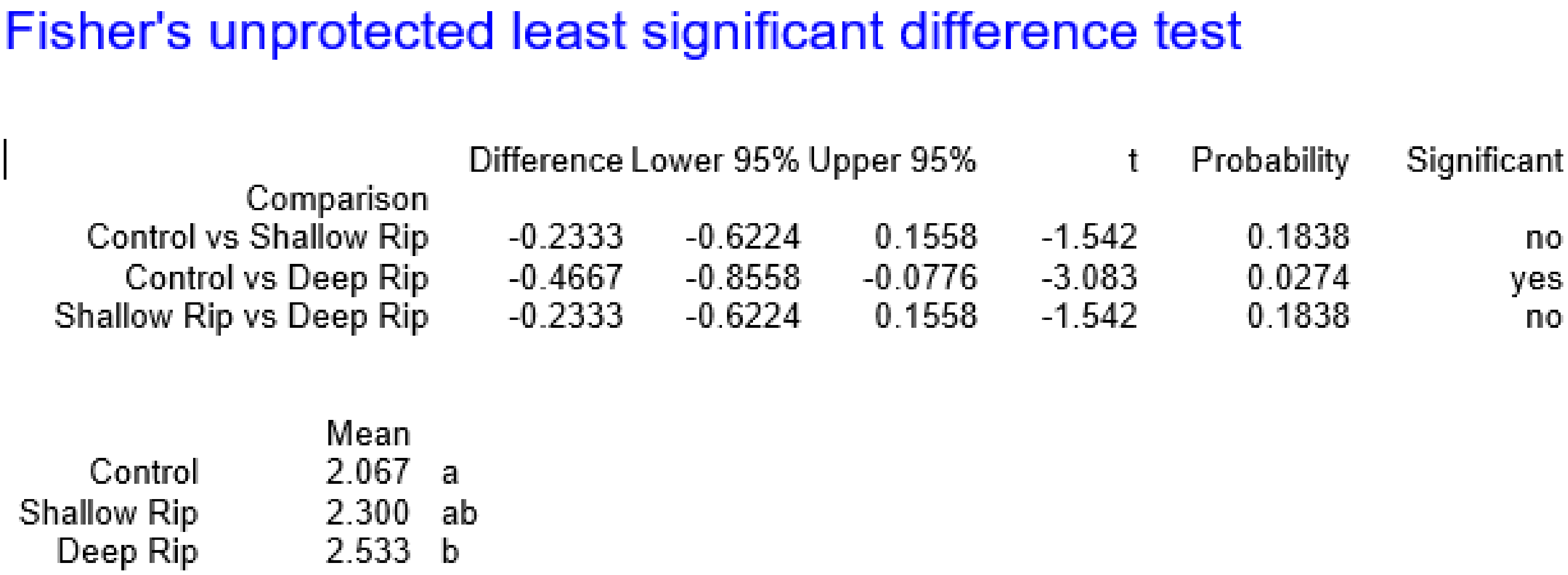
```
 Treatment        Control     Deep Rip   Shallow Rip
                    2.067        2.533         2.300
```

Least significant differences of means (5% level)

```
l.s.d.                 0.3891
```

Analysis in Genstat

- Treatment comparison summaries:

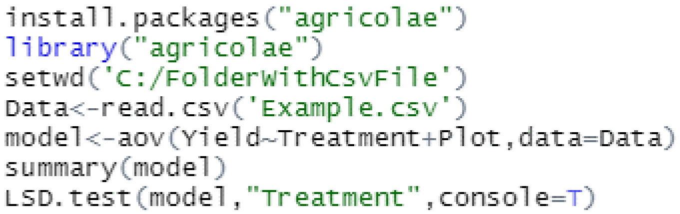


Fisher's unprotected least significant difference test

```
                           Difference Lower 95% Upper 95%        t   Probability   Significant
                Comparison
    Control vs Shallow Rip    -0.2333   -0.6224    0.1558   -1.542        0.1838            no
       Control vs Deep Rip    -0.4667   -0.8558   -0.0776   -3.083        0.0274           yes
  Shallow Rip vs Deep Rip     -0.2333   -0.6224    0.1558   -1.542        0.1838            no


                 Mean
     Control     2.067   a
 Shallow Rip     2.300   ab
    Deep Rip     2.533   b
```

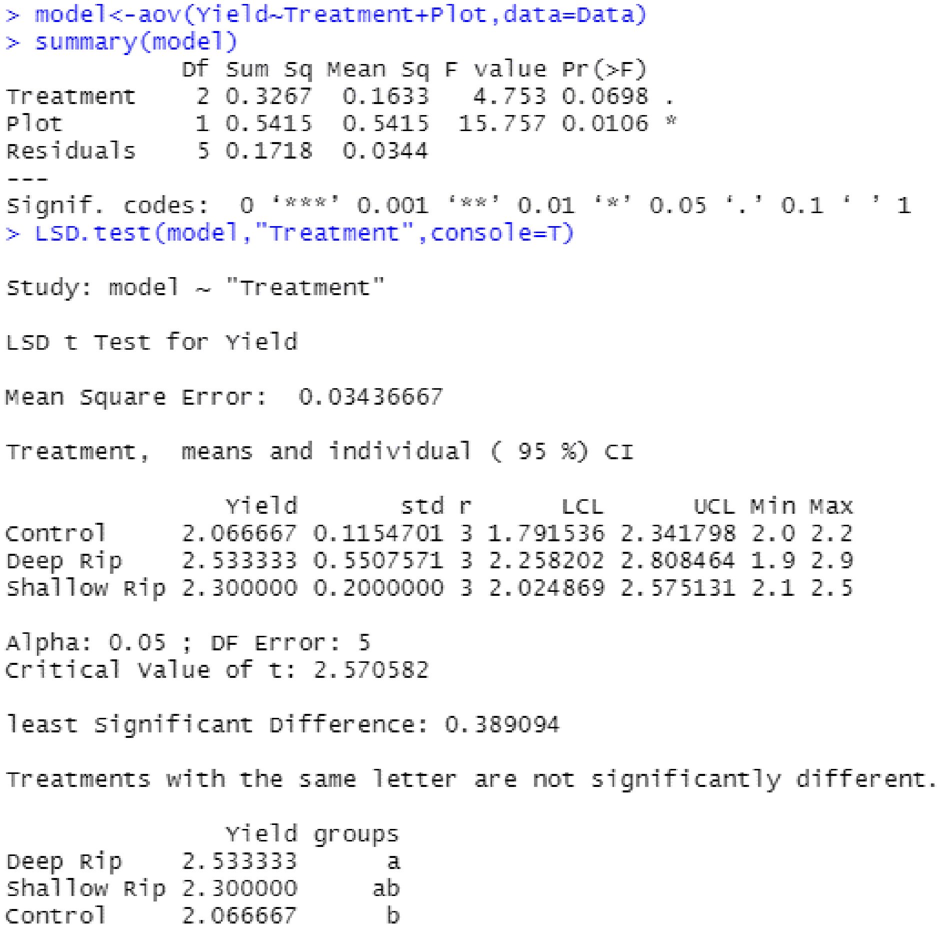
Analysis in R

Code:



```
install.packages("agricolae")
library("agricolae")
setwd('C:/FolderWithCsvFile')
Data<-read.csv('Example.csv')
model<-aov(Yield~Treatment+Plot,data=Data)
summary(model)
LSD.test(model,"Treatment",console=T)
```

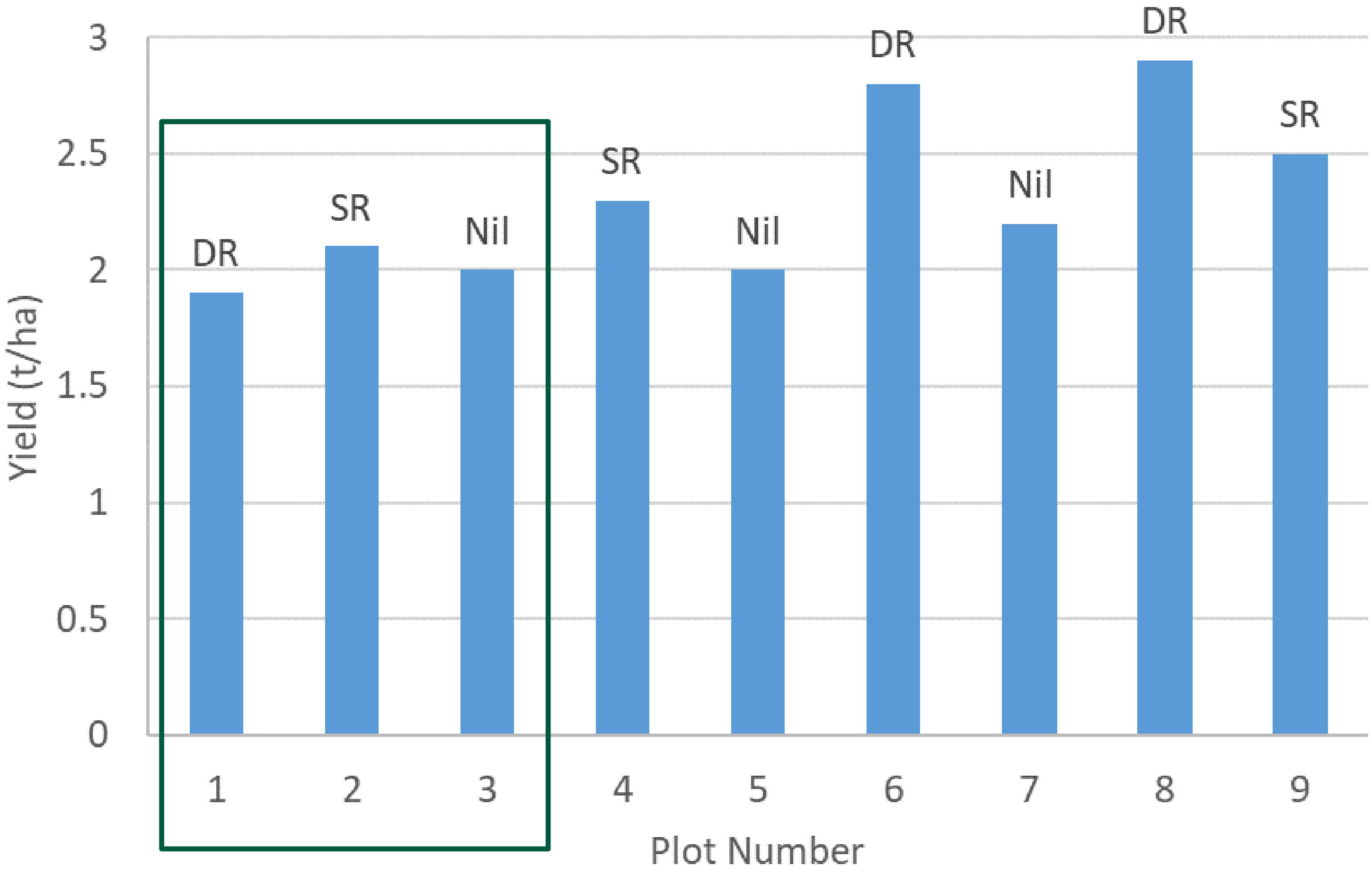
Output:



```
> model<-aov(Yield~Treatment+Plot,data=Data)
> summary(model)
            Df Sum Sq Mean Sq F value Pr(>F)
Treatment    2 0.3267  0.1633   4.753 0.0698 .
Plot         1 0.5415  0.5415  15.757 0.0106 *
Residuals    5 0.1718  0.0344
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1
> LSD.test(model,"Treatment",console=T)

Study: model ~ "Treatment"

LSD t Test for Yield

Mean Square Error:  0.03436667

Treatment,  means and individual ( 95 %) CI

               Yield       std r      LCL      UCL Min Max
Control     2.066667 0.1154701 3 1.791536 2.341798 2.0 2.2
Deep Rip    2.533333 0.5507571 3 2.258202 2.808464 1.9 2.9
Shallow Rip 2.300000 0.2000000 3 2.024869 2.575131 2.1 2.5

Alpha: 0.05 ; DF Error: 5
Critical Value of t: 2.570582

least Significant Difference: 0.389094

Treatments with the same letter are not significantly different.

               Yield groups
Deep Rip    2.533333      a
Shallow Rip 2.300000     ab
Control     2.066667      b
```

Importance of replication

- **What might we have concluded if we only did Rep 1?**



Analysis Support

- **recommend getting maximum value by consulting a biometrician**
  - DPIRD contact: Andrew van Burgel
  - SAGI (“Statistics for the Australian Grains Industry”)
- **Questions?**

Thank you

Visit dpird.wa.gov.au

Important disclaimer
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