

**Changes in Seedling height according to the seed rate**

**Bg 374**

**Days after sowing**

**Seedling height 1 V1**

The SAS System 05:18 Thursday, December 15, 2018 1

The ANOVA Procedure

Class Level Information

Class Levels Values

Trt 4 1 2 3 4

Number of Observations Read 12

Number of Observations Used 12

The SAS System 05:18 Thursday, December 15, 2018 2

The ANOVA Procedure

Dependent Variable: hieght1

Sum of

Source DF Squares Mean Square F Value Pr > F

Model 3 2.55209167 0.85069722 607.64 <.0001

Error 8 0.01120000 0.00140000

Corrected Total 11 2.56329167

R-Square Coeff Var Root MSE hieght1 Mean

0.995631 0.638599 0.037417 5.859167

Source DF Anova SS Mean Square F Value Pr > F

Trt 3 2.55209167 0.85069722 607.64 <.0001

The SAS System 05:18 Thursday, December 15, 2018 3

The ANOVA Procedure

t Tests (LSD) for hieght1

NOTE: This test controls the Type I comparison wise error rate, not the experiment wise error rate.

Alpha 0.05

Error Degrees of Freedom 8

Error Mean Square 0.0014

Critical Value of t 2.30600

Least Significant Difference 0.0704

Means with the same letter are not significantly different.

t Grouping Mean N Trt

A 6.36667 3 1

B 6.18333 3 2

C 5.71000 3 3

D 5.17667 3 4

**Seedling height 2 V1**

The SAS System 05:18 Thursday, December 15, 2018 4

The ANOVA Procedure

Class Level Information

Class Levels Values

Trt 4 1 2 3 4

Number of Observations Read 12

Number of Observations Used 12

The SAS System 05:18 Thursday, December 15, 2018 5

The ANOVA Procedure

Dependent Variable: hieght2

Sum of

Source DF Squares Mean Square F Value Pr > F

Model 3 40.16669167 13.38889722 11727.5 <.0001

Error 8 0.00913333 0.00114167

Corrected Total 11 40.17582500

R-Square Coeff Var Root MSE hieght2 Mean

0.999773 0.424080 0.033789 7.967500

Source DF Anova SS Mean Square F Value Pr > F

Trt 3 40.16669167 13.38889722 11727.5 <.0001

The SAS System 05:18 Thursday, December 15, 2018 6

The ANOVA Procedure

t Tests (LSD) for hieght2

NOTE: This test controls the Type I comparisonwise error rate, not the experimentwise error rate.

Alpha 0.05

Error Degrees of Freedom 8

Error Mean Square 0.001142

Critical Value of t 2.30600

Least Significant Difference 0.0636

Means with the same letter are not significantly different.

t Grouping Mean N Trt

A 10.18000 3 1

B 9.28000 3 2

C 6.73333 3 3

D 5.67667 3 4

**Seedling height 3 V1**

The SAS System 05:18 Thursday, December 15, 2018 7

The ANOVA Procedure

Class Level Information

Class Levels Values

Trt 4 1 2 3 4

Number of Observations Read 12

Number of Observations Used 12

The SAS System 05:18 Thursday, December 15, 2018 8

The ANOVA Procedure

Dependent Variable: hieght3

Sum of

Source DF Squares Mean Square F Value Pr > F

Model 3 136.3042250 45.4347417 14856.0 <.0001

Error 8 0.0244667 0.0030583

Corrected Total 11 136.3286917

R-Square Coeff Var Root MSE hieght3 Mean

0.999821 0.546419 0.055302 10.12083

Source DF Anova SS Mean Square F Value Pr > F

Trt 3 136.3042250 45.4347417 14856.0 <.0001

The SAS System 05:18 Thursday, December 15, 2018 9

The ANOVA Procedure

t Tests (LSD) for hieght3

NOTE: This test controls the Type I comparisonwise error rate, not the experimentwise error rate.

Alpha 0.05

Error Degrees of Freedom 8

Error Mean Square 0.003058

Critical Value of t 2.30600

Least Significant Difference 0.1041

Means with the same letter are not significantly different.

t Grouping Mean N Trt

A 14.85000 3 1

B 11.69000 3 2

C 7.59333 3 3

D 6.35000 3 4

**Seedling height 4 V1**

The SAS System 05:18 Thursday, December 15, 2018 13

The ANOVA Procedure

Class Level Information

Class Levels Values

Trt 4 1 2 3 4

Number of Observations Read 12

Number of Observations Used 12

The SAS System 05:18 Thursday, December 15, 2018 14

The ANOVA Procedure

Dependent Variable: hieght4

Sum of

Source DF Squares Mean Square F Value Pr > F

Model 3 141.6703583 47.2234528 2257.69 <.0001

Error 8 0.1673333 0.0209167

Corrected Total 11 141.8376917

R-Square Coeff Var Root MSE hieght4 Mean

0.998820 1.038917 0.144626 13.92083

Source DF Anova SS Mean Square F Value Pr > F

Trt 3 141.6703583 47.2234528 2257.69 <.0001

The SAS System 05:18 Thursday, December 15, 2018 15

The ANOVA Procedure

t Tests (LSD) for hieght4

NOTE: This test controls the Type I comparisonwise error rate, not the experimentwise error rate.

Alpha 0.05

Error Degrees of Freedom 8

Error Mean Square 0.020917

Critical Value of t 2.30600

Least Significant Difference 0.2723

Means with the same letter are not significantly different.

t Grouping Mean N Trt

A 18.4367 3 1

B 15.8867 3 2

C 11.6700 3 3

D 9.6900 3 4

**Seedling height 1 V2**

The SAS System 05:18 Thursday, December 15, 2018 16

The ANOVA Procedure

Class Level Information

Class Levels Values

Trt 4 1 2 3 4

Number of Observations Read 12

Number of Observations Used 12

The SAS System 05:18 Thursday, December 15, 2018 17

The ANOVA Procedure

Dependent Variable: hieght1

Sum of

Source DF Squares Mean Square F Value Pr > F

Model 3 2.15015833 0.71671944 627.78 <.0001

Error 8 0.00913333 0.00114167

Corrected Total 11 2.15929167

R-Square Coeff Var Root MSE hieght1 Mean

0.995770 0.492964 0.033789 6.854167

Source DF Anova SS Mean Square F Value Pr > F

Trt 3 2.15015833 0.71671944 627.78 <.0001

The SAS System 05:18 Thursday, December 15, 2018 18

The ANOVA Procedure

t Tests (LSD) for hieght1

NOTE: This test controls the Type I comparisonwise error rate, not the experimentwise error rate.

Alpha 0.05

Error Degrees of Freedom 8

Error Mean Square 0.001142

Critical Value of t 2.30600

Least Significant Difference 0.0636

Means with the same letter are not significantly different.

t Grouping Mean N Trt

A 7.36333 3 1

B 7.18000 3 2

C 6.47333 3 3

D 6.40000 3 4

**Seedling height 2 V2**

The SAS System 05:18 Thursday, December 15, 2018 19

The ANOVA Procedure

Class Level Information

Class Levels Values

Trt 4 1 2 3 4

Number of Observations Read 12

Number of Observations Used 12

The SAS System 05:18 Thursday, December 15, 2018 20

The ANOVA Procedure

Dependent Variable: hieght2

Sum of

Source DF Squares Mean Square F Value Pr > F

Model 3 58.82442500 19.60814167 9804.07 <.0001

Error 8 0.01600000 0.00200000

Corrected Total 11 58.84042500

R-Square Coeff Var Root MSE hieght2 Mean

0.999728 0.448222 0.044721 9.977500

Source DF Anova SS Mean Square F Value Pr > F

Trt 3 58.82442500 19.60814167 9804.07 <.0001

The SAS System 05:18 Thursday, December 15, 2018 21

The ANOVA Procedure

t Tests (LSD) for hieght2

NOTE: This test controls the Type I comparisonwise error rate, not the experimentwise error rate.

Alpha 0.05

Error Degrees of Freedom 8

Error Mean Square 0.002

Critical Value of t 2.30600

Least Significant Difference 0.0842

Means with the same letter are not significantly different.

t Grouping Mean N Trt

A 12.25333 3 1

B 11.72333 3 2

C 9.25000 3 3

D 6.68333 3 4

**Seedling height 3 V2**

The SAS System 05:18 Thursday, December 15, 2018 22

The ANOVA Procedure

Class Level Information

Class Levels Values

Trt 4 1 2 3 4

Number of Observations Read 12

Number of Observations Used 12

The SAS System 05:18 Thursday, December 15, 2018 23

The ANOVA Procedure

Dependent Variable: hieght3

Sum of

Source DF Squares Mean Square F Value Pr > F

Model 3 134.4644917 44.8214972 1238.16 <.0001

Error 8 0.2896000 0.0362000

Corrected Total 11 134.7540917

R-Square Coeff Var Root MSE hieght3 Mean

0.997851 1.457861 0.190263 13.05083

Source DF Anova SS Mean Square F Value Pr > F

Trt 3 134.4644917 44.8214972 1238.16 <.0001

The SAS System 05:18 Thursday, December 15, 2018 24

The ANOVA Procedure

t Tests (LSD) for hieght3

NOTE: This test controls the Type I comparisonwise error rate, not the experimentwise error rate.

Alpha 0.05

Error Degrees of Freedom 8

Error Mean Square 0.0362

Critical Value of t 2.30600

Least Significant Difference 0.3582

Means with the same letter are not significantly different.

t Grouping Mean N Trt

A 16.1200 3 1

A

A 15.7733 3 2

B 12.5233 3 3

C 7.7867 3 4

**Seedling height 4 V2**

The SAS System 05:18 Thursday, December 15, 2018 25

The ANOVA Procedure

Class Level Information

Class Levels Values

Trt 4 1 2 3 4

Number of Observations Read 12

Number of Observations Used 12

The SAS System 05:18 Thursday, December 15, 2018 26

The ANOVA Procedure

Dependent Variable: hieght4

Sum of

Source DF Squares Mean Square F Value Pr > F

Model 3 148.4019667 49.4673222 2091.64 <.0001

Error 8 0.1892000 0.0236500

Corrected Total 11 148.5911667

R-Square Coeff Var Root MSE hieght4 Mean

0.998727 0.957668 0.153786 16.05833

Source DF Anova SS Mean Square F Value Pr > F

Trt 3 148.4019667 49.4673222 2091.64 <.0001

The SAS System 05:18 Thursday, December 15, 2018 27

The ANOVA Procedure

t Tests (LSD) for hieght4

NOTE: This test controls the Type I comparisonwise error rate, not the experimentwise error rate.

Alpha 0.05

Error Degrees of Freedom 8

Error Mean Square 0.02365

Critical Value of t 2.30600

Least Significant Difference 0.2896

Means with the same letter are not significantly different.

t Grouping Mean N Trt

A 19.6633 3 1

B 18.3433 3 2

C 15.7500 3 3

D 10.4767 3 4

**Dry weight - Bg 360**

The SAS System 20:26 Wednesday, December 8, 2018

61

The ANOVA Procedure

Class Level Information

Class Levels Values

Trt 4 1 2 3 4

Number of Observations Read 12

Number of Observations Used 12

The SAS System 20:26 Wednesday, December 8, 2018

62

The ANOVA Procedure

Dependent Variable: Drywgt

Sum of

Source DF Squares Mean Square F Value Pr > F

Model 3 0.00436798 0.00145599 69.07 <.0001

Error 8 0.00016865 0.00002108

Corrected Total 11 0.00453663

R-Square Coeff Var Root MSE Drywgt Mean

0.962824 5.557260 0.004591 0.082621

Source DF Anova SS Mean Square F Value Pr > F

Trt 3 0.00436798 0.00145599 69.07 <.0001

The SAS System 20:26 Wednesday, December 8, 2018

63

The ANOVA Procedure

t Tests (LSD) for Drywgt

NOTE: This test controls the Type I comparison wise error rate, not the experiment wise error rate.

Alpha 0.05

Error Degrees of Freedom 8

Error Mean Square 0.000021

Critical Value of t 2.30600

Least Significant Difference 0.0086

Means with the same letter are not significantly different.

t Grouping Mean N Trt

A 0.102283 3 1

A

A 0.101000 3 2

B 0.065600 3 3

B

B 0.061600 3 4

**Dry weight - Bg 374**

The SAS System 20:26 Wednesday, December 8, 2018

73

The ANOVA Procedure

Class Level Information

Class Levels Values

Trt 4 1 2 3 4

Number of Observations Read 12

Number of Observations Used 12

The SAS System 20:26 Wednesday, December 8, 2018

74

The ANOVA Procedure

Dependent Variable: Drywgt

Sum of

Source DF Squares Mean Square F Value Pr > F

Model 3 0.00468366 0.00156122 10.76 0.0035

Error 8 0.00116086 0.00014511

Corrected Total 11 0.00584452

R-Square Coeff Var Root MSE Drywgt Mean

0.801377 10.38011 0.012046 0.116049

Source DF Anova SS Mean Square F Value Pr > F

Trt 3 0.00468366 0.00156122 10.76 0.0035

The SAS System 20:26 Wednesday, December 8, 2018

75

The ANOVA Procedure

t Tests (LSD) for Drywgt

NOTE: This test controls the Type I comparison wise error rate, not the experiment wise error rate.

Alpha 0.05

Error Degrees of Freedom 8

Error Mean Square 0.000145

Critical Value of t 2.30600

Least Significant Difference 0.0227

Means with the same letter are not significantly different.

t Grouping Mean N Trt

A 0.141167 3 1

A

B A 0.119600 3 2

B

B 0.117633 3 3

C 0.085797 3 4

**Chlorophyll content Bg 360**

The SAS System 20:26 Wednesday, December 8, 2018

88

The ANOVA Procedure

Class Level Information

Class Levels Values

Trt 4 1 2 3 4

Number of Observations Read 12

Number of Observations Used 12

The SAS System 20:26 Wednesday, December 8, 2018 89

The ANOVA Procedure

Dependent Variable: Chrphl

Sum of

Source DF Squares Mean Square F Value Pr > F

Model 3 2.51333333 0.83777778 0.25 0.8611

Error 8 27.11333333 3.38916667

Corrected Total 11 29.62666667

R-Square Coeff Var Root MSE Chrphl Mean

0.084833 5.869189 1.840969 31.36667

Source DF Anova SS Mean Square F Value Pr > F

Trt 3 2.51333333 0.83777778 0.25 0.8611

The SAS System 20:26 Wednesday, December 8, 2018 90

The ANOVA Procedure

t Tests (LSD) for Chrphl

NOTE: This test controls the Type I comparisonwise error rate, not the experimentwise error rate.

Alpha 0.05

Error Degrees of Freedom 8

Error Mean Square 3.389167

Critical Value of t 2.30600

Least Significant Difference 3.4663

Means with the same letter are not significantly different.

t Grouping Mean N Trt

A 31.900 3 2

A

A 31.733 3 1

A

A 31.000 3 4

A

A 30.833 3 3

**Chlorophyll content Bg 374**

The SAS System 20:26 Wednesday, December 8, 2018 91

The ANOVA Procedure

Class Level Information

Class Levels Values

Trt 4 1 2 3 4

Number of Observations Read 12

Number of Observations Used 12

The SAS System 20:26 Wednesday, December 8, 2018 92

The ANOVA Procedure

Dependent Variable: Chrphl

Sum of

Source DF Squares Mean Square F Value Pr > F

Model 3 17.01583333 5.67194444 2.47 0.1364

Error 8 18.37333333 2.29666667

Corrected Total 11 35.38916667

R-Square Coeff Var Root MSE Chrphl Mean

0.480820 4.774405 1.515476 31.74167

Source DF Anova SS Mean Square F Value Pr > F

Trt 3 17.01583333 5.67194444 2.47 0.1364

The SAS System 20:26 Wednesday, December 8, 2018 93

The ANOVA Procedure

t Tests (LSD) for Chrphl

NOTE: This test controls the Type I comparison wise error rate, not the experiment wise error rate.

Alpha 0.05

Error Degrees of Freedom 8

Error Mean Square 2.296667

Critical Value of t 2.30600

Least Significant Difference 2.8534

Means with the same letter are not significantly different.

t Grouping Mean N Trt

A 33.333 3 4

A

B A 32.333 3 1

B A

B A 31.100 3 2

B

B 30.200 3 3

**Root length V1**

The SAS System 20:26 Wednesday, December 8, 2018 1

The ANOVA Procedure

Class Level Information

Class Levels Values

Trt 4 1 2 3 4

Number of Observations Read 12

Number of Observations Used 12

The SAS System 20:26 Wednesday, December 8, 2018 2

The ANOVA Procedure

Dependent Variable: Rootlength

Sum of

Source DF Squares Mean Square F Value Pr > F

Model 3 26294.51752 8764.83917 5.98 0.0193

Error 8 11717.38520 1464.67315

Corrected Total 11 38011.90271

R-Square Coeff Var Root MSE Rootlength Mean

0.691744 16.77760 38.27105 228.1080

Source DF Anova SS Mean Square F Value Pr > F

Trt 3 26294.51752 8764.83917 5.98 0.0193

The SAS System 20:26 Wednesday, December 8, 2018 3

The ANOVA Procedure

t Tests (LSD) for Rootlength

NOTE: This test controls the Type I comparisonwise error rate, not the experimentwise error rate.

Alpha 0.05

Error Degrees of Freedom 8

Error Mean Square 1464.673

Critical Value of t 2.30600

Least Significant Difference 72.058

Means with the same letter are not significantly different.

t Grouping Mean N Trt

A 274.63 3 1

A

A 272.84 3 2

B 197.23 3 3

B

B 167.72 3 4

**Root length V2**

The SAS System 20:26 Wednesday, December 8, 2018 46

The ANOVA Procedure

Class Level Information

Class Levels Values

Trt 4 1 2 3 4

Number of Observations Read 12

Number of Observations Used 12

The SAS System 20:26 Wednesday, December 8, 2018 47

The ANOVA Procedure

Dependent Variable: Rootlength

Sum of

Source DF Squares Mean Square F Value Pr > F

Model 3 8795.56212 2931.85404 6.11 0.0182

Error 8 3837.02239 479.62780

Corrected Total 11 12632.58451

R-Square Coeff Var Root MSE Rootlength Mean

0.696260 6.552229 21.90041 334.2436

Source DF Anova SS Mean Square F Value Pr > F

Trt 3 8795.562116 2931.854039 6.11 0.0182

The SAS System 20:26 Wednesday, December 8, 2018 48

The ANOVA Procedure

t Tests (LSD) for Rootlength

NOTE: This test controls the Type I comparisonwise error rate, not the experimentwise error rate.

Alpha 0.05

Error Degrees of Freedom 8

Error Mean Square 479.6278

Critical Value of t 2.30600

Least Significant Difference 41.235

Means with the same letter are not significantly different.

t Grouping Mean N Trt

A 368.49 3 1

A

A 339.01 3 3

A

A 336.83 3 2

B 292.65 3 4

**Number of seedlings per 25cm2 v1**

The SAS System 20:26 Wednesday, December 8, 2018 106

The ANOVA Procedure

Class Level Information

Class Levels Values

Trt 4 1 2 3 4

Number of Observations Read 12

Number of Observations Used 12

The SAS System 20:26 Wednesday, December 8, 2018 107

The ANOVA Procedure

Dependent Variable: numberofseedlings

Sum of

Source DF Squares Mean Square F Value Pr > F

Model 3 38.00594005 12.66864668 254.98 <.0001

Error 8 0.39747860 0.04968483

Corrected Total 11 38.40341865

R-Square Coeff Var Root MSE numberofseedlings Mean

0.989650 2.048647 0.222901 10.88040

Source DF Anova SS Mean Square F Value Pr > F

Trt 3 38.00594005 12.66864668 254.98 <.0001

The SAS System 20:26 Wednesday, December 8, 2018 108

The ANOVA Procedure

t Tests (LSD) for numberofseedlings

NOTE: This test controls the Type I comparison wise error rate, not the experiment wise error rate.

Alpha 0.05

Error Degrees of Freedom 8

Error Mean Square 0.049685

Critical Value of t 2.30600

Least Significant Difference 0.4197

Means with the same letter are not significantly different.

t Grouping Mean N Trt

A 13.3021 3 4

B 11.6885 3 3

C 9.9493 3 2

D 8.5817 3 1

**Number of seedlings per 25cm2 v2**

The SAS System 20:26 Wednesday, December 8, 2018 109

The ANOVA Procedure

Class Level Information

Class Levels Values

Trt 4 1 2 3 4

Number of Observations Read 12

Number of Observations Used 12

The SAS System 20:26 Wednesday, December 8, 2018 110

The ANOVA Procedure

Dependent Variable: numberofseedlings

Sum of

Source DF Squares Mean Square F Value Pr > F

Model 3 32.90740560 10.96913520 257.02 <.0001

Error 8 0.34142260 0.04267783

Corrected Total 11 33.24882820

R-Square Coeff Var Root MSE numberofseedlings Mean

0.989731 2.255437 0.206586 9.159472

Source DF Anova SS Mean Square F Value Pr > F

Trt 3 32.90740560 10.96913520 257.02 <.0001

The SAS System 20:26 Wednesday, December 8, 2018 111

The ANOVA Procedure

t Tests (LSD) for numberofseedlings

NOTE: This test controls the Type I comparisonwise error rate, not the experimentwise error rate.

Alpha 0.05

Error Degrees of Freedom 8

Error Mean Square 0.042678

Critical Value of t 2.30600

Least Significant Difference 0.389

Means with the same letter are not significantly different.

t Grouping Mean N Trt

A 11.2960 3 4

B 10.1323 3 3

C 8.1631 3 2

D 7.0464 3 1