

Online resource 4/5:

Field Trial Evaluation 1 (alate and apterous aphids)

Data

The statistical analysis was run on the following data set called datsum with the variables:

- *Var*: Different treatments
- *Plot*: Plots on the field
- *inpl*: Location of the lettuce plants in the plots (0: border, 1: centre)
- *aphids_sum*: sum of aphids per location in each plot
- *n*: Number of lettuce plants for each sum
- *scaled_sum*: scaled sums calculated as $(\text{aphids_sum}+1)/n$

Tab.S8 Summed total number of alate and apterous aphids in first evaluation

var	plot	inpl	aphids_sum	n	scaled_sum
NF	5	0	192	18	10.722
NF	5	1	35	12	3.000
NF	8	0	53	18	3.000
NF	8	1	35	12	3.000
NF	12	0	110	18	6.167
NF	12	1	116	12	9.750
PEB	3	0	2	18	0.167
PEB	3	1	1	12	0.167
PEB	7	0	0	18	0.056
PEB	7	1	0	12	0.083
PEB	13	0	11	18	0.667
PEB	13	1	0	12	0.083
PEG	1	0	70	18	3.944
PEG	1	1	8	12	0.750
PEG	9	0	22	18	1.278
PEG	9	1	51	12	4.333
PEG	11	0	89	18	5.000
PEG	11	1	8	12	0.750
SFB	4	0	3	18	0.222
SFB	4	1	0	12	0.083
SFB	6	0	0	18	0.056
SFB	6	1	0	12	0.083
SFB	14	0	0	18	0.056
SFB	14	1	0	12	0.083
SFG	2	0	133	18	7.444
SFG	2	1	28	12	2.417
SFG	10	0	14	18	0.833
SFG	10	1	27	12	2.333
SFG	15	0	149	18	8.333
SFG	15	1	38	12	3.250

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Statistical analysis

A linear mixed model was fit to the data as described in the text

```
library(lme4)
lmm_fit <- lmer(log(scaled_sum) ~ var * inpl + (1|plot), data=datsum)
```

ANOVA

```
library(lmerTest)
anova(lmm_fit)
```

Tab.S9 ANOVA table of alate and apterous aphids in first evaluation

Effect	SSQ	MSQ	NumDF	DenDF	F_value	p_Value
var	85.014	21.254	4	20	32.711	<0.001
inpl	1.213	1.213	1	20	1.867	0.187
var:inpl	0.458	0.115	4	20	0.176	0.948

The ANOVA (**Tab.S9**) revealed the significance ($\alpha = 0.05$) of the treatment (Var) since the p-value is far smaller than 0.05, but no location effect (inpl) nor a treatment-location interaction (Var:inpl).

Mean comparisons between the treatments

The mean comparisons were run on the logarithm of the scaled sums (as the model does), but are already back transformed to the original scale for easier interpretation. The least square means of the scaled sums for each treatment, their standard error and their 95% confidence intervals are given in table 3.

```
# Model based Least square means and their comparisons
library(emmeans)
lmm_comp <- emmeans(lmm_fit, specs="var", contr="pairwise", type="response")

# LS-means for the treatments
lmm_comp$emmeans
```

Tab.S10 Least square means and their confidence intervals of alate and apterous aphids in first evaluation

var	mean	se	df	lower	upper
NF	5.091	1.675	10	2.445	10.598
PEB	0.139	0.046	10	0.067	0.289
PEG	1.986	0.654	10	0.954	4.135
SFB	0.086	0.028	10	0.041	0.178
SFG	3.134	1.031	10	1.505	6.524

The mean comparisons (contrasts) were run as differences on the log-scale. Therefore back transformation results in the ratio between the means of the scaled sums. These ratios, their standard error and the corresponding p-values are given in **Tab.S11**.

```
# Contrast tests
lmm_comp$contrasts
```

Tab.S11 Contrasts and p-values of alate and apterous aphids in first evaluation

contrast	ratio	se	df	t_ratio	p_value
NF / PEB	36.682	17.071	10	7.741	0.000
NF / PEG	2.563	1.193	10	2.022	0.322
NF / SFB	59.384	27.636	10	8.776	0.000
NF / SFG	1.624	0.756	10	1.042	0.830
PEB / PEG	0.070	0.033	10	-5.718	0.001
PEB / SFB	1.619	0.753	10	1.035	0.834
PEB / SFG	0.044	0.021	10	-6.698	0.000
PEG / SFB	23.171	10.783	10	6.753	0.000
PEG / SFG	0.634	0.295	10	-0.980	0.858
SFB / SFG	0.027	0.013	10	-7.733	0.000

Location effect

The model based average scaled sums for each location were compared on log-scale. Back-transformations results in a ratio between both sums (0: border plant, 1: inner plant). Please note that the ratio is not significantly different from zero.

```
# Model based Least square means and ther comparisons for the Location effect
lmm_comp_inpl <- emmeans(lmm_fit, specs="inpl",
                        contr="pairwise", type="response")

# Ratio between the mean scaled sums for each Location
lmm_comp_inpl$contrasts
```

Tab.S12 Ratios of scaled sums between the locations of alate and apterous aphids in first evaluation

contrast	ratio	se	df	t_ratio	p_value
0 / 1	1.495	0.44	10	1.366	0.202

Location effect in each treatment

Ratios between the scaled sums of the border plants (0) and the inner plants (1) split by the treatments are given in **Tab.S13** . Please note, that none of these ratios is significantly different from zero.

```
# Model based Least square means and ther comparisons for the Location effect
# in each treatment
lmm_comp_inter <- emmeans(lmm_fit, specs="inpl", by="var",
                        contr="pairwise", type="response")

# Ratios
lmm_comp_inter$contrasts
```

Tab.S13 Ratios of scaled sums between the locations and p-values of alate and apterous aphids in first evaluation

contrast	var	ratio	se	df	t_ratio	p_value
0 / 1	NF	1.312	0.864	10	0.413	0.688
0 / 1	PEB	1.747	1.150	10	0.848	0.416
0 / 1	PEG	2.178	1.434	10	1.183	0.264
0 / 1	SFB	1.058	0.696	10	0.086	0.933
0 / 1	SFG	1.413	0.930	10	0.525	0.611