STAT 450

January 9 and 11, 2018

**Biosolids Activity 1**

1. Four plant species: ASAG, HECO, KOMA, LITT

Questions:

* Does the plant cover value differ among species?
* Is the plant cover value affected by biosolids treatment?

1. Questions to client:

* Were there any changes to the land over the time the data was collected? Any other factors that would affect independence over time?
  + A control block of land (baseline) – see how it changes over time (changes will not be affected by treatment)
* How do you visually assess the percent cover – is this accurate?
* Do some plant species naturally grow faster than others?
* Are the land blocks significantly different and would that affect the results?

1. Hypothesis:

H0: (µASAG,B - µASAG,C)= (µHECO,B - µHECO,C) = (µKOMA,B - µKOMA,C) = (µLITT,B - µLITT,C)

µi,j = population mean of plant cover value for species *i* and treatment *j*

HA: At least one mean plant cover difference is different among the four species

Response Variable: Plant cover value

Explanatory Variable: Species, Treatment (biosolid vs. control)

Methods: ANOVA (randomized block design) or pairwise t-test

* Factor: Treatment, Levels: 2 (can do t-test)
* Factor: Species, Levels: 4 (cannot do t-test)
* Pairwise t-test – use Bonferroni adjustment to correct for the chance that you will wrongly reject a hypothesis

Data in Table 1 is not sufficient – only has means (not individual data or standard deviations)

1. Null Hypothesis:

Plot A: Population mean percent cover between biosolid treatment and no treatment is equal

(µc = µB)

Plot B: Population mean percent cover between biosolid treatment and no treatment is equal for all species *i* (µic = µiB)

(same as our hypothesis)

Plot C: Population mean percent cover without treatment is equal for all four species.

(μ1c = μ2c = μ3c = μ4c)

Plot D: Population mean percent cover between biosolid treatment and no treatment is equal for species LITT. (μCL = μBL)

1. It would be better to have quantiles (0, 25, 50, 75). It may be sufficient, but more data is better.

* Needs n (sample size)

MWD = measures quality of soil

4 blocks = block of *land*

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | 1 | 2 | 3 | 4 | Marginals |
| B | μ1B |  |  |  | μB |
| C | μ1c | μ2c | μ3c | μ4c | μC |
| Marginals | μ1 | μ3 | μ3 | μ4 | μ |

Suppose we want to compare B vs C for just species LITT. Should we just do a t-test or take all data into account?

A: Needs a benchmark - can be more informative if we look at all data