

Do bean beetles prefer dry or moist beans? Comparing egg laying preferences.

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Introduction:

- The bean beetle (*Callosobruchus maculatus*) is a worldwide pest that damages harvested beans by planting eggs on beans that subsequently are eaten by hatched larvae.
- Bean beetles tolerate a range of humidity. lay eggs on dry beans in research experiments, but the beetles may act differently if given different moisture options (1.)
- Bean beetles also don't consume any water/food after leaving the bean, hence, adult beetles may lay their eggs in more nutrient/water dense beans so their eggs can access and exploit the most energy.
- Hypothesis:** When provided with beans with different water content, females will alter their egg laying preferences.

Methodology:

- 50 grams of mung bean was allocated to each treatment. This made it possible to measure the increase in weight due to water absorption.
- The control group and treatment groups were distributed as shown in figure 2. **Eight replicates** were made, and beetles were added.
- The female-male ratio was set to 10:2.
- The dishes were left untouched for 24 hours to ensure egg-laying, then placed in a refrigerator until counting.

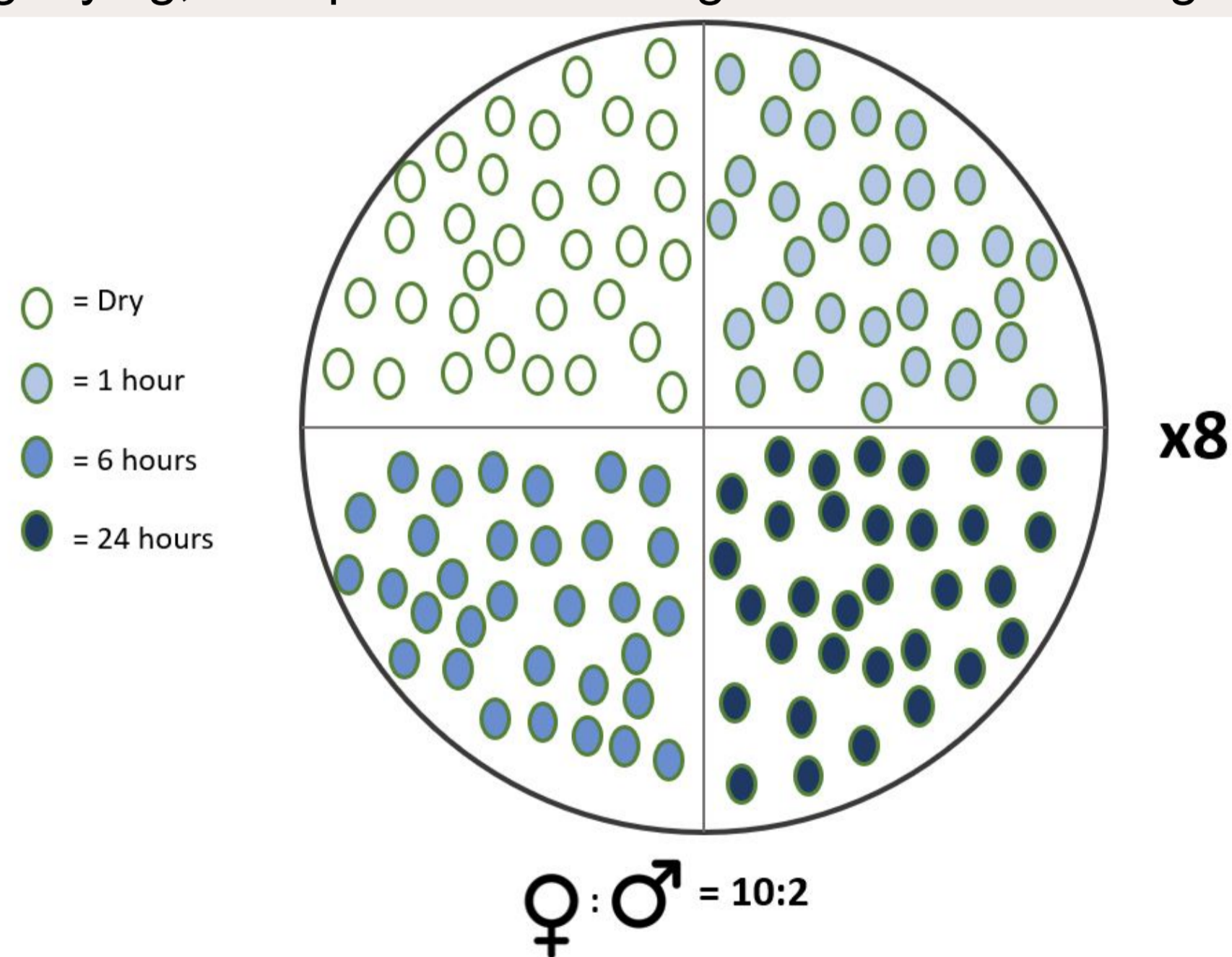


Figure 1: Bean placement, treatment, and beetles sex ratio.



Figure 2: Differences in weight (grams) before and after soaking treatments (Dry, 1 hour, 6 hours, 24 hours.)



Figure 3: Comparison of beans from different treatment from left to right: dry, 1 hour soaked, 6 hour soaked and 24 hours soaked.

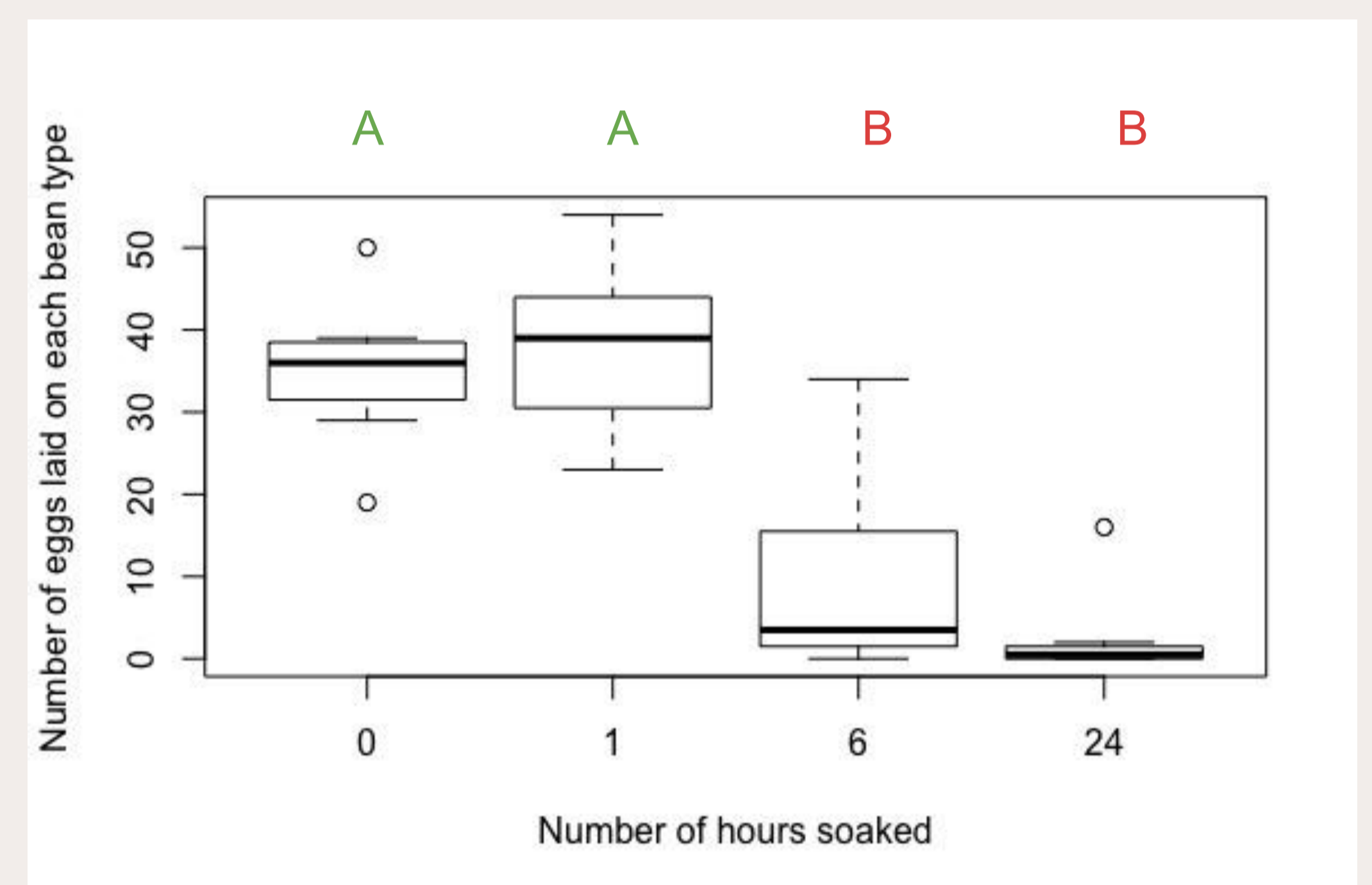


Figure 4: Mean number of eggs laid per treatment (0, 1, 6, 24 hours, Rstudio 2015.)

Results:

- Results indicated there was a significant difference between bean beetle egg laying preference and treatment time (ANOVA, $F_1=35.065$, $p < 0.001$)
- There was more eggs on dry and one hour soaked beans (A) compared to beans that had been soaked for 6 and 24 hours (B) (post hoc analysis - TukeyHSD test, $n=8$)(2)

Discussion:

- Results indicate beetles prefer dry and slightly soaked beans compared to more moist beans.**
- Beans that were soaked for a longer time had cases of sprouting and some mold starting to form. This may have affected results.
- Increased size may have affected the beetle's bean preference to a higher extent than the actual moisture.
- Beetles were observed in every type of treatment during counting, so lack of movement cannot explain variation.
- Bean beetles may prefer untreated beans because this is what they are adapted to in the lab, were not virgins and had laid previously on dry beans.

REFERENCES:

- (1) Schoof, H. (1941). The Effects of Various Relative Humidities on the Life Processes of the Southern Cowpea Weevil, *Callosobruchus Maculatus* (FABR.) at 30 C., +/- 0.8 Degrees. *Ecology*, 22(3), pp.297-305.
- (2) RStudio Team (2015) RStudio: Integrated Development for R. RStudio, Inc., Boston, MA 216 URL <http://www.rstudio.com/>.