Paper Summary 1

Title: Prescribed fire and partial overstory removal alter an acorn–rodent conditional mutualism
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Research question, motivation, and focus of the paper

This paper explores the effects of common forest management practices on the behaviors of acorn-eating rodents. This is important because these granivorous rodents have a mutualistic relationship with oak trees, and their acorn harvesting and hoarding behavior affects the distribution of oaks in regrowing forests. Oak trees, in turn, greatly influence the structure and composition of the forest. They are also a high value natural resource.

Significance of the topic and hypotheses tested

This paper is significant because it addresses a gap in current research. The animal behavior being assessed has been shown to be important to the formation and regeneration of oak trees and of forests in general, but there are no prior studies on how this behavior is affected by common forest management practices such as controlled burning and midstory removal.

Hypotheses Tested:

- Experiment 1: Floor Distribution
    - H_0 : Dispersal distance and survival are unchanged in burned areas/canopy gaps
    - H_1 : Dispersal distance and survival are different in burned areas/canopy gaps
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- Experiment 2: Cache Survival
    - H_0 : Buried acorn survival is unchanged in burned areas/canopy gaps
    - H_1 : Buried acorn survival is different in burned areas/canopy gaps

Research approach, methods, and data analyzed

Experiment 1 focused on the survival of acorns placed on the forest floor. The acorns were curated for health and size, and a tiny transponder was attached to each one.

Care was taken to avoid contamination during this process. The acorns were then distributed at presentation stations on the forest floor. Researchers searched the surrounding area for transponder acorns at intervals out to 7 months The researchers then recorded the distance and direction each acorn had traveled, as well as the condition of the acorn. The process occurred in two treated stands and a control area.

This data was then analyzed in three ways. Logistic regression was used to determine how far the acorns tended to move, and how this movement was influenced by stand position and burn treatment. The researchers then tested how final distance and position were affected by starting location relative to burn treatments. Logistic regression was used again to determine if the acorn's final condition was affected by distance traveled or treatment factors.

Experiment 2 focused on the fate of "cached" acorns, which are those acorns that were previously buried by a granivorous rodent. The acorns were prepared in a similar manner to the acorns in Experiment 1, but magnets were used for detectability instead of transponders. These acorns were buried in a manner simulating rodent caches, but placed in grids in order to generate more consistent data. These grids were arranged to place equal amounts of caches in burned, unburned and canopy-cleared areas. Researchers then surveyed the grids and the surrounding area with magnetic locators at intervals out to 29 weeks. More data was collected for these acorns: The percent of herbaceous and woody cover, the amount of coarse woody debris, the average litter depth, the distance to the nearest real tree and the percent of canopy cover. This occurred in the same stands and control area as Experiment 1.

The data for Experiment 2 was analyzed in four ways. Much like the first experiment, logistic regression was used to assess how acorn survival was affected by stand position and burn treatment. It was also used to assess the probability of an individual acorn germinating. Logistic regression was then used to determine the effects of ground cover and canopy on cache survival. Finally, permutational ANOVAs were used to assess how stand, burn treatment and position interacted with the recorded microvariables. The data was then reduced from four dimensions to two for visualization purposes.

Results, their significance, and key implications

Experiment 1: Researchers were able to verify the location of 60.7% of the acorns used in the experiment. Of these, 32 (15.7%) were intact, and 28 of these had been buried in rodent caches. The position of the presentation stations within the stand had a strong effect on survival, and the effect of previous burns was found to be marginal but statistically significant. Movement was found to be strongly affected by canopy factors, but unaffected by burn treatments. Directional differences were not tested for due to insufficient sample size.

Experiment 2: 43.3% of cached acorns were not ‘stolen’ and survived to potentially germinate. Two thirds of these survivors germinated by the following May. Caches were 44% more likely to survive in the burned areas, and 1.5 times more likely to survive in the treatment stands as compared to the control area. Survivability was negatively impacted by available ground cover and distance to tree, but not canopy cover. Further analysis confirmed that tree distance and low-lying cover are the greatest predictors for cache survival.

Paper Summary 2

Title: The Association between Index of Nutritional Quality (INQ) and Obesity: Baseline Data of Kharameh Cohort
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Authors: Maryam Jalali, Parisa Keshani, Masoumeh Ghoddusi Johari, Ramin Rezaeianzadeh, Seyed Vahid Hosseini, and Abbas Rezaeianzadeh

Research question, motivation, and focus of the paper
This paper examines relatively recent changes in dietary habits in Iran in order to explore how nutrient intake affects obesity. Obesity is a common problem throughout the developed world, and it has become apparent that the cause of this condition cannot be explained by calorie intake alone. A greater understanding of how nutrient intake interacts with obesity can lead to better nutritional guidelines and improved treatments.

Significance of the topic and hypotheses tested
It can be difficult to arrange a control group in nutritional studies because it is difficult to closely control and monitor the behavior of large groups of humans. A large-scale change in behavior or environment, in this case the implementation of a first-world level food supply, can be examined to approximate having a control group.

For each nutrient in the 17 nutrients:
- H_0 : Nutrient levels are the same for normal/overweight/obese
- H_1 : Nutrient levels are higher or lower for normal/overweight/obese

Research approach, methods, and data analyzed
The study had over ten thousand participants over a three year period. Participants were between 40-70 and filtered for factors such as reluctance and mental ability. Demographic and physical activity data was collected via questionnaire, while dietary habits were assessed by interview. The BMI of each participant was recorded, and the dietary information was processed using a computer program that calculated nutrient information from the respondent’s list of foods. An Index of Nutritional Quality (INQ) score was then computed for each nutrient for each participant. INQ is the ratio of nutrient-to-calorie content in food.

Results, their significance, and key implications

Significant results were obtained for iron, vitamins b & c, zinc, magnesium and selenium. Iron appears to offer some protection against obesity. This association is well known, and this study suggests that low iron intake is more likely to be a cause of obesity, although low iron levels could still be a symptom of the condition. A correlation between low levels of B vitamins and obesity was confirmed. Vitamin C is crucial to overall health and metabolism, so a deficiency can cause weight gain, among other issues. There appears to be a relationship between obesity and micronutrients such as selenium, magnesium and zinc, but foods rich in these nutrients tend to also be rich in other nutrients, so more study is needed.