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ABOVEGROUND INSECTS ON THE PAWNEE SITE, 1970

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ABSTRACT

Biweekly aboveground insect samples were collected on the Pawnee Site from April through October 1970. Numbers and weights of insects by taxa were recorded in the Grassland Biome data bank. Principal groups present were ants (Formicidae) and leafhoppers (Cicadellidae).

## METHODS

Sampling in 1970 for aboveground insects at the Pawnee Site was conducted on eight plots representing four grazing treatments (ungrazed, lightly grazed, moderately grazed, and heavily grazed) with two replicates per treatment. It was conducted on a biweekly basis from late April to the first week of October. Ten samples per treatment (five per replicate) were taken on each sample date.

The sampling was done with the use of a  $0.5 \text{ m}^2$  circular quick-trap dropped from the end of an 18-ft boom. The boom was mounted on a two-wheeled cart to make it portable. Once the trap was in place, the contents were vacuumed out by the use of a D-vac vacuum insect net.

The samples were then taken to the laboratory and hand sorted for insects by sieving the complete contents through a series of sieves grading from an inch opening sieve to a 60-mesh sieve. The insects were frozen for later segregation and identification at Colorado State University (Entomology Department). The vials of insects with field collection data were taken to the Entomology laboratory every other week, approximately one week after collection.

Processing began by hand sorting into separate vials each species by weight categories. In some instances, it was more feasible to put a family-stage as one group, i.e., all Cicadellidae nymphs were classed as one weight category. Weights of the groups in each category were determined when the groups were large enough to weigh on a balance with a precision of  $10^{-4}$  g. When there was a wide range of biomass for a species or a small number of relatively large individuals, insects were separated individually. All weighing was done after the samples were dried at  $65^\circ\text{C}$  for 24 hours.

Since some insects occur in small numbers and size, it was necessary on occasion to pool a large enough number to be weighed. Others occur in large numbers with little variation in biomass. In order to obtain the rapid data return desired and still maintain the required accuracy, these insects were pooled into reasonable lots and weighed to obtain a standard weight for the species-size group.

Once separated, species identification was undertaken by comparison with specimens present in the Colorado State University Entomology Department collection and vouchered by Dr. T. O. Thatcher. In some instances specimens were sent to specialists for identification.

A preliminary analysis of the data reveals that the insect population, as a whole, had a bimodal population growth during the growing season at the Pawnee Site (Fig. 1). Population numbers fluctuate greatly through time although biomass does not show a similar pattern. The increase in the total insect population during peaks is due to the production of large numbers of insects of negligible individual biomass. The populations on all grazing treatments had similar growth patterns, and further analysis revealed no observable difference between grazing treatments on a seasonal basis. The first and largest peak growth occurred on or near June 9. This peak represents the spring and early summer build-up of the insect population from the low numbers of overwintering forms and eggs in conjunction with the peak growth of plants. A sweep-net study of the insect population in 1969 also showed a bimodal population growth. Therefore, the bimodal population growth may be an inherent characteristic of the insects of the shortgrass prairie, possibly due to adaption to the distribution of precipitation (Fig. 2), temperature, and their effect on primary productivity.

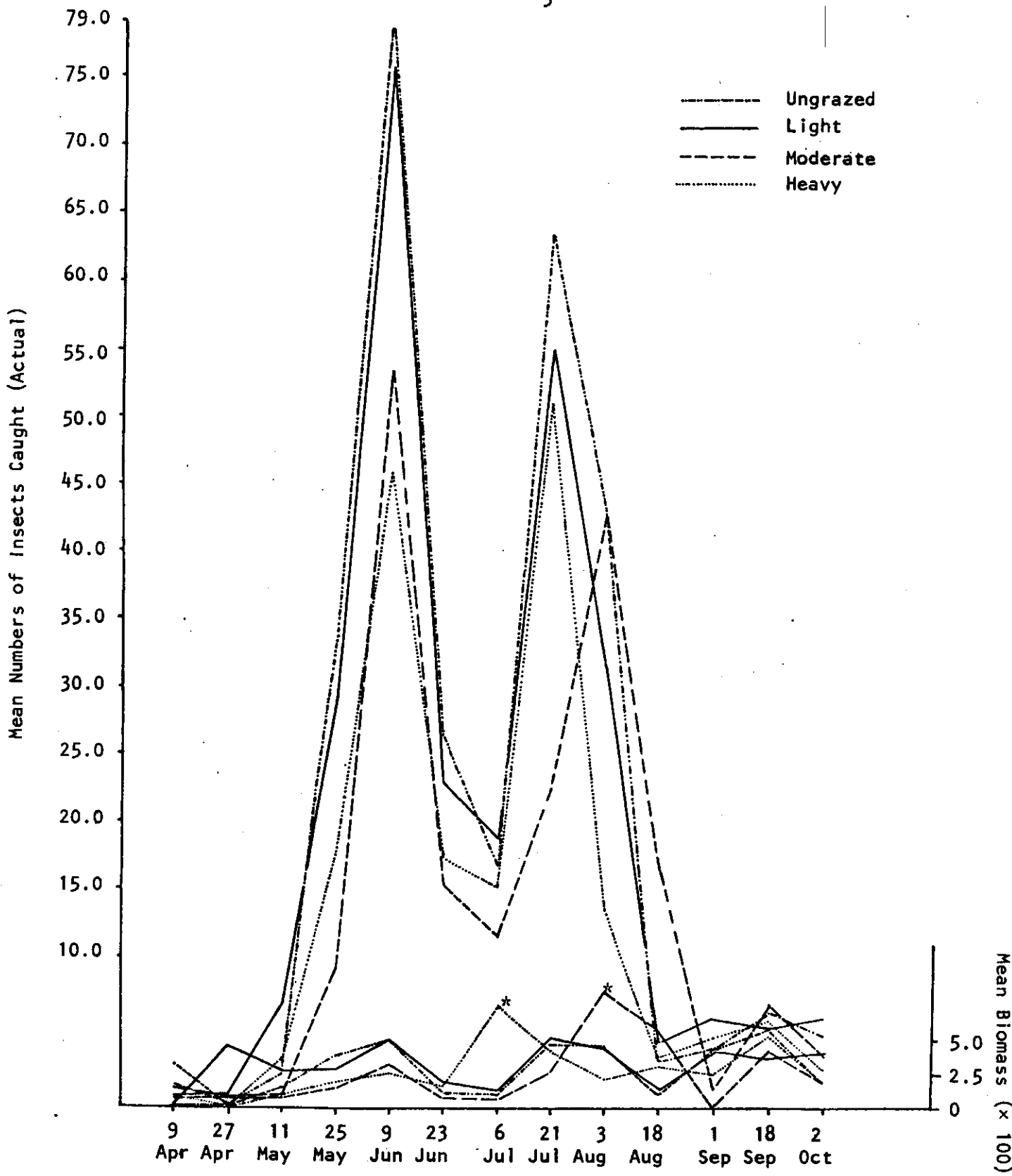


Fig. 1. Comparison of mean numbers of insects with mean biomass for the Pawnee Site during 1970. The asterisks represent chance capture of 4 and 3 *Eleodes obsoleta*, respectively.

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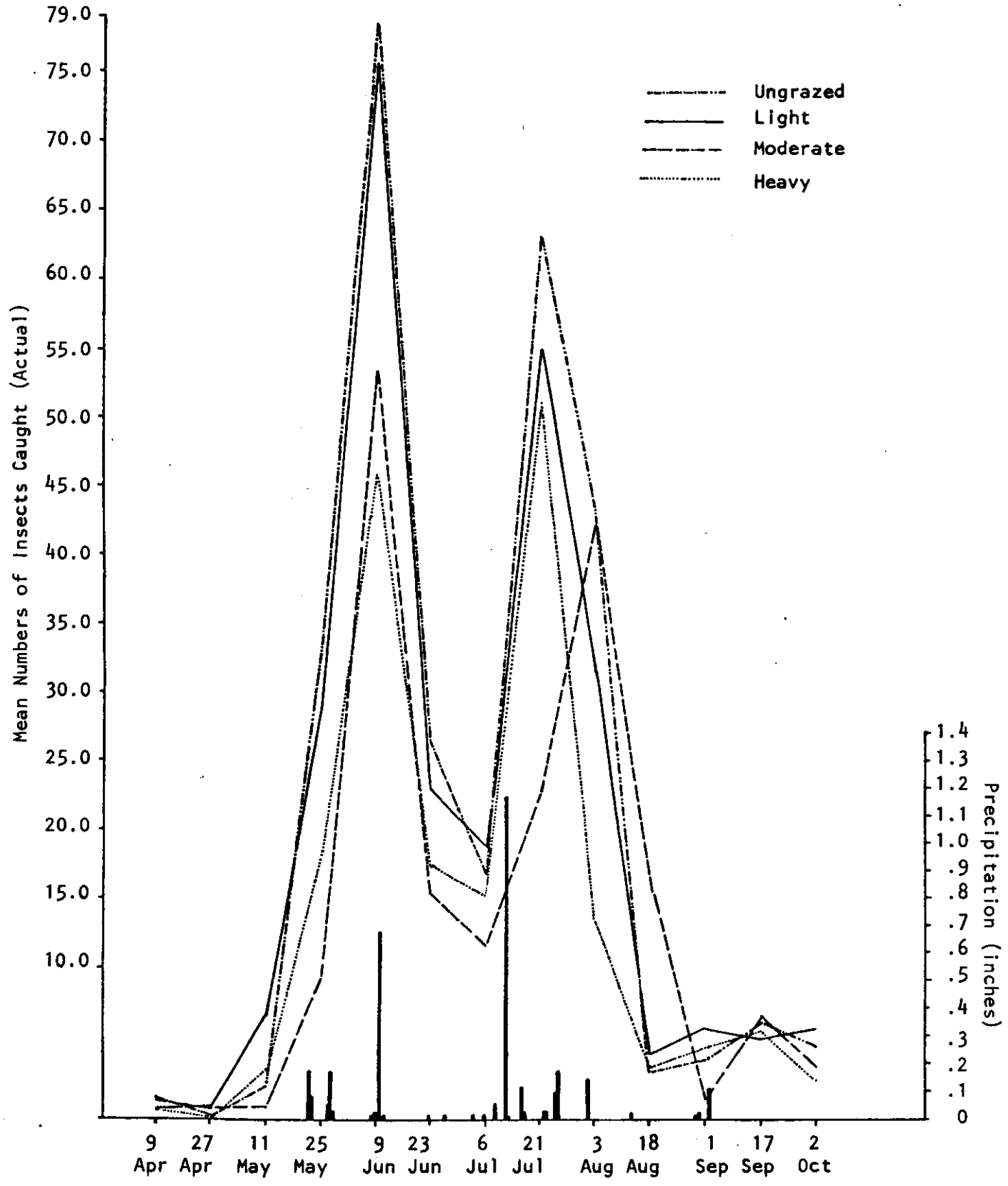


Fig. 2. Comparison of mean numbers of insects with precipitation for the Pawnee Site during 1970.

The 1970 data show the families Formicidae and Cicadellidae to be the largest contributors of numbers and biomass, though neither is consistently greater than the other. Further statistical analysis is necessary to ascertain an accurate appraisal of the functional or taxonomic insect groups responsible for the greatest impact on the shortgrass prairie ecosystem. Analysis of insect numbers by family over time may be found in McDaniel (1971). In depth analysis is currently being performed on the data stored at the Grassland Ecology Research Laboratory, Colorado State University, Fort Collins, Colorado.

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LITERATURE CITED

- McDaniel, B. 1971. Role of invertebrates in the Grassland Biome. Speech given at AIBS Meetings at Colorado State University on September 1. (To be printed in Range Sci. Dep. Sci. Ser. No. 10.)

APPENDIX I  
FIELD DATA SHEET

Pawnee Insects

Data on invertebrates collected by the quick-trap method in 1970 at the Pawnee Site is Grassland Biome Data Set A2U300B. Data were collected on form NREL-30. A sample data form and an example of the data follow.

All data has been converted to four-character code for use throughout the Comprehensive Network. It is regrettable that time was consumed in such a wasteful process, but the decision to change to a four-character code was made after a sizeable portion of data had been processed. Therefore, it was felt better to proceed with consistency and make a single-step conversion than to have the data reported differently, thus hindering the flow of data analysis.



