ACTIVITY CYCLES OF CARPENTER ANTS
(HYMENOPTERA : FORMICIDAE : CAMPONOTUS)
AND SUBTERRANEAN TERMITES
(ISOPTERA : RHINOTERMITIDAE : RETICULITERMES):
INERENCE FROM SYNANTHRPIC RECORDS
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SUMMARY

Annual activity cycles of carpenter ants and subterranean termites were extracted from data maintained by cooperative extension service entomologists in Connecticut, Maryland, New Jersey, North Carolina and Ohio. Autocorrelations suggested a strong cyclic patterning of public complaints, which increased in regularity from south to north. Spectral analysis revealed that the more northern states had complaint peaks occurring at longer frequencies, while more southern states had shorter frequency fluctuations, as expected if climatological factors drive the system. The existence of data such as these can be of great value in designing field experiments.

RESUME

Cycles d’activité des fourmis-charpentières (Hymenoptera : Formicidae : Camponotus) et des termites souterrains (Isoptera : Rhinotermitidae : Reticulitermes) : déduction à partir de relevés synanthropiques

Les cycles d’activité annuels des fourmis-charpentières et des termites souterrains ont été déduits des relevés pursuivis par le service coopératif des entomologistes dans le Connecticut, le Maryland, le New Jersey, la Caroline du Nord et l’Ohio. Les auto-correlations suggèrent une forte structure cyclique des plaintes issues du public, avec une régularité augmentée du sud au nord. L’analyse spectrale révèle que les États les plus au nord présentaient des pics de plaintes à des fréquences plus grandes, alors que les États plus au sud avaient des fluctuations de fréquences plus courtes, comme on pouvait s’y attendre si les facteurs climatiques réglaient le système. De tels résultats peuvent être de grande valeur pour les expériences conduites dans la nature.

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INTRODUCTION

Of the major urban insect pests in the Northeastern United States, carpenter ants, primarily *Camponotus pennsylvanicus* (De Geer), and subterranean termites, principally *Reticulitermes flavipes* Kollar, are the major wood-destroying structural pests. In spite of their economic importance, detailed data on their yearly activity is lacking, especially from urban areas. Both species are common components of woodland faunas (Shelford, 1913), and their general life cycles are well known. Obviously, a knowledge of their seasonal activity patterns should lead to a more rational strategy for their management.

Ever since C. Elton (1924) advanced the view that animal population cycles are linked to fluctuations of extrinsic and intrinsic factors, studies on population cycles and theories to explain these have become commonplace in the literature. Few, if any, comparable works have been performed for social insects, principally because of their cryptic habits and the often time consuming and costly methods of destructive sampling needed to adequately sample colonies. These factors are even more pronounced for entirely subterranean or wood-dwelling species. In lieu of long-term field studies of social insect populations, are there alternative data bases available to approximate at least their fluctuations in activity, especially for the economically important species?

Here we show how secondary data, consisting of records of complaints and queries from the general public, can be used to infer field activity cycles. We then discuss what aspect of field activity is probably sampled, as well as how this source of untapped data can be used to design field experiments to study activity related phenomena, to suggest hypotheses about the organisms in question, or to devise more rational management alternatives.

METHODS

Monthly records of the number of carpenter ant and subterranean termite queries from the general public were extracted from files maintained by the Cooperative Extension Entomologists from five north-eastern states. The length of the records ranged from 5 years (Maryland, 1976-1980) to 49 years (Ohio, 1930-1978), with the remaining states being intermediate (New Jersey, 1974-1980; Connecticut, 1962-1980; North Carolina, 1954-1980). For ease of description and analyses, January, 1930, the earliest record, was assigned a value of \( t = 1 \), and each successive month was assigned successive integers. The last time interval recorded was consequently \( t = 612 \), or December, 1980. In those rare instances where a monthly value was missing, due to illness or vacations of extension entomologists, a random number was generated by computer for that value from a normal distribution. In no case did any time series have more than 1% of its values missing. Complete time series were needed due to the methodological constraints of the statistics used. As data were exponentially smoothed for subsequent analyses, the generated random numbers had little effect on the overall patterns detected.