Book of Abstracts

CNiE 2023
PALERMO
XXV Congresso Nazionale
Italiano di Entomologia

12-16 June 2023

Università degli Studi di Palermo

SAAF Dipartimento Scienze Agrarie Alimentari Forestali 80 1942 2022

Società Entomologica Italiana

Accademia Nazionale Italiana di Entomologia

CNiE 2023
PALERMO
XXVII Congresso Nazionale Italiano di Entomologia

SESSION III
ECOLOGY AND CONSERVATION

Predicting the effect of global warming on dung removal of three Geotrupidae species (Coleoptera, Geotrupidae)

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Global warming is affecting spatial and temporal distribution of insects that in turn affect their ability to provide ecosystem services to society. Dung beetles are an important component of Alpine areas because of their ability to provide key ecological processes. This is particularly true for dung removal that promotes multiple ecosystem services such as nutrient cycling, pest removal and seed dispersal. However, the effect of global warming on dung removal has been scarcely investigated. Here we quantified dung removal efficiency of three Geotrupidae species (*Anoplotrupes stercorosus* (Scriba,1791), *Geotrupes stercorarius* (Linnaeus, 1758), *Trypocopris pyrenaeus* (Charpentier, 1825)) in experimentally warming treatments and used experimental results as the basis for spatio-temporal modelling of dung removal based on past (1981-2005) and future (2011-2100) temperature scenarios in the altitudinal belt 600-1400 m of the Piedmont region. For each species, dung removal efficiency of dung beetle pairs (i.e. one female + one male) was quantified at different temperatures (i.e. 5°C, 10°C, 15°C, 20°C, 28°C and 36°C). A biological model between dung removal and temperature was built from experimental data for each species separately and then used for spatio-temporal modelling. In this regard, high resolution (1x1km) temperature data were coupled with the biological model to obtain estimates of dung removal for the entire study area. For the past scenario changes in dung removal due to global warming were quantified by taking into account changes in pasture extent. Three scenarios of global warming (low, moderate and high carbon emissions) and in three time intervals (2011-2040, 2041-2070 and 2071-2100) were considered for modelling future trends. Our results show how increasing temperatures in the past (1981-2005) may have boosted rates of spring dung removal in the entire study area (expressed as amount of dung removed per month per pair), potentially compensating for the reduction of grassland extension in pasture-based livestock farming systems. Quite interestingly, models for future scenarios showed a weak increase in dung removal limited to the most extreme scenarios, suggesting a resilience of this ecosystem service. Our inferences on changes in dung removal rates for the past and our predictions for the future can inform land-use planning and decision making for adaptation strategies of livestock management in Alpine areas.

KEY WORDS: dung beetles, dung removal, ecosystem services, global warming.

ORAL PRESENTATION

XXVII ITALIAN NATIONAL CONGRESS OF ENTOMOLOGY
12 - 16 JUNE 2023, PALERMO