

M-2245

SOCIAL INSECTS AND THE ENVIRONMENT

Proceedings of the 11th International Congress of IUSI, 1990
(International Union for the Study of Social Insects)

DANIEL WOJCIK

Editors

**G.K. VEERESH
B. MALLIK
C.A. VIRAKTAMATH**



OXFORD & IBH PUBLISHING CO. PVT. LTD.
New Delhi Bombay Calcutta

DANIEL WOJCIK

**THERMOREGULATION IN THE FIRE ANT, SOLENOPSIS
INVICTA**

PORTER, SANFORD D.

USDA-ARS, Insects Affecting Man and Animals Research Laboratory, P.O. Box 14565,
Gainesville, Florida 32604, USA.

Temperature is a central element in the life of fire ant colonies. Changing temperatures strongly affect all metabolic processes, including rates of activity, development, respiration and even longevity. While temperature is a controlling factor, this does not mean that colonies are completely subject to its vicissitudes. In fact, fire ants are very effective thermoregulators.

There are two keys to fire ant thermoregulation: The first is the mound and the second is behavioral tracking of changing temperatures. The mound itself functions as a solar collecting device. Workers thermoregulate by cycling up and down in the tunnel matrix of their mound as it warms or cools.

Laboratory binary choice tests indicated that well-fed colonies prefer 30-32°C while hungry colonies selected slightly cooler temperatures, apparently in an effort to improve colony growth efficiency.

Field studies of soil temperatures and fire ant thermoregulatory responses indicated that construction of a mound improved a colony's growth potential by about 10% and temperature tracking behavior improved growth potential by another 10%. Higher benefits might have been expected except that thermoregulation is generally only beneficial on sunny days when soil temperatures are within the growth window for fire ant brood (21-32°C).