

## **ABSTRACT**

This study examines thermoregulation behavior of wood ant genus *Formica* on elevation gradient. Two years long datalogger records of inner nest and ambient temperature were combined with detailed spring-summer manual measurement of nest temperature in different depths below nest surface. Results show that inner nest temperature was higher than air temperature in all seasons. Temperature of ant nest is highest in the deepest layer, the heat flows from inside out. We can assume that thermal homeostasis of ant nest in spring and summer i.e. in period of ant highest activity is influenced mainly by inner heat sources – microbial activity and ant metabolism. Insulation seems to have direct effect on nest temperature only in early spring; in summer insulation affects nest temperature indirectly, via ant activity. In winter there is pronounced effect of nest volume which corresponds high isolative properties of nest material. Our results indicate that thermoregulatory behavior of wood ants is driven by endogenous factors, namely colony needs in sense of queen oviposition brood development. Both of these require high temperature.

Nests at variable altitude did not differ in average seasonal temperature or seasonal temperature fluctuation. Variability of nest temperature was bigger among nests from one locality than between localities with different altitude. Yet data from manual measurement show there is similarity in temperature regime between nests from the lowest and highest locality. Possible explanation for this discrepancy should be searched among other environmental factors. All nests show similar length of period with increased inner nest temperature ( $T > 20^{\circ}\text{C}$ ), approximately 100 days, even though the start of this period may differ among nests. There was found significant effect of altitude onto night change of inner nest temperature in all seasons and also on daily average temperature and temperature fluctuation in summer and autumn. Altitude affects air temperature fluctuation in all seasons too, surprisingly at highest altitude there occurred lower air temperature fluctuations. Average seasonal air temperature did not differ between localities with different altitude.

### **Key words:**

thermoregulation, wood ants, genus *Formica*, effect of altitude, brood development