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Effect of moisture content on nest construction activity of fire ants¹ DARIA MONAENKOVA, NICKOLAS GRAVISH, DANIEL GOLDMAN, MICHAEL GOODISMAN, Georgia Institute of Technology — Large underground nests protect ants from severe weather and predators. Field observations have revealed that the soil wetness affects the nest building activity. In this work we use x-ray computed tomography to study the growth of fire ants nests as a function of soil moisture content. Because capillary cohesion in wet soils leads to the competition between tunnel stability and the labor-intensity of the excavation, we expect to find an optimal soil wetness, which allows the most effective nest construction. We prepared digging containers (3.8 cm diameter by 14.5 cm deep aluminum tubes) with 2 types of simulated soil (50 and 210 μm glass particles). The prepared moisture content W varied from 0.01 to 0.18 by mass. Hundred ants were allowed to dig in the containers for 20 hours. Although, the ants were able to construct tunnels in all moisture levels, the maximum tunnel depth, H , was significantly affected by W . At moderate moisture content ($W=0.1$) H was at least twice greater than at the lowest moisture content ($W=0.01$) for all tested colonies ($n=9$) for both particle sizes. The increase in H mirrors the dependence of the soil cohesion on W and we therefore conclude that the tunnel stability is a key factor influencing the digging strategy of fire ants.

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