The ability of an organism to detect threats is fundamental to mounting a successful defence and this is particularly important when resisting parasites. Early detection of parasites allows for initiation of defence mechanisms which are vital in mitigating the cost of infection and are likely to be especially important in social species, particularly those whose life-history makes parasite pressure more significant. However, understanding of the relative strength of behavioural responses in different species is still limited. Here I test the response of ants from four species with differing life-histories to fungal parasites in three different contexts. The results show that ants can detect fungi on their food, environment and nestmates, and suggest that ants from different species respond differently depending on the source of contamination. The response to contaminated food correlated with the vulnerability of each ant’s food store; from highly discriminatory leaf-cutting ants with their delicate fungal crops, to less selective weaver ants which tend not to store food. Ants showed a tendency to avoid fungal-contaminated surfaces and increase grooming levels in response to fungal-contaminated nestmates, showing that ants are capable of recognising fungal threats in various contexts and suggesting that species may differ in their behavioural responses in ways that correlate broadly with their life histories and their specific vulnerabilities to pathogens.