Title: Non-lethal fungal infection could reduce aggression towards strangers in ants.

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Supplementary Table 1. Sample size per interaction assay in the case of colony aggression (baseline aggression, manipulation of the CHC-profiles). The number of colonies used in each test (reported separately for live individuals and for dummies), the number of tests and the test type are reported.

| Test type          | No. of tests performed in each type of experiments | No. of colonies used for live individuals in each test | No. of live individuals/colony | No. of colonies used for dummies in each test | No. of dummies/colony |
|--------------------|--------------------------------------------------|-----------------------------------------------------|--------------------------------|---------------------------------------------|-----------------------|
| I-I Extract        | 9                                                | 2                                                   | 3                             | 2                                           | 3                     |
| I-U Extract        | 9                                                | 2                                                   | 3                             | 2                                           | 3                     |
| U-I Extract        | 9                                                | 2                                                   | 3                             | 2                                           | 3                     |
| I-U U Extract      | 9                                                | 2                                                   | 3                             | 2                                           | 3                     |
| I-I Corpse         | 18                                               | 3                                                   | 6                             | 3                                           | 6                     |
| I-U Corpse         | 9                                                | 3                                                   | 6                             | 3                                           | 6                     |
| U-I Corpse         | 9                                                | 3                                                   | 6                             | 3                                           | 6                     |
| U-U Corpse         | 18                                               | 3                                                   | 6                             | 3                                           | 6                     |
| U-U Corpse+c23     | 12                                               | 3                                                   | 6                             | 3                                           | 6                     |
| I-U Corpse+c23     | 6                                                | 3                                                   | 2                             | 3                                           | 3                     |
| I-U Extract+c23    | 6                                                | 3                                                   | 2                             | 3                                           | 3                     |
| U-U Extract+c23    | 12                                               | 3                                                   | 2                             | 3                                           | 3                     |
| I-U Washed         | 9                                                | 3                                                   | 3                             | 3                                           | 3                     |
| U-U Washed         | 9                                                | 3                                                   | 3                             | 3                                           | 3                     |
| I-I Washed         | 9                                                | 3                                                   | 3                             | 3                                           | 3                     |
Supplementary Table 2. Sample size per interaction assay in the case of intracolonial aggression (control, within nest). The number of colonies used in each test, the number of tests and the test type are reported.

| No. of colonies used for live individuals in each test | No. of live individuals/colony | No. of colonies used for dummies in each test | No. of dummies/colony | No. of tests performed in each type of experiments | Test type |
|-------------------------------------------------------|-------------------------------|-----------------------------------------------|-----------------------|---------------------------------------------------|-----------|
| 3                                                     | 3                             | 3                                             | 3                     | 9                                                 | I-I Untreated |
| 3                                                     | 3                             | 3                                             | 3                     | 9                                                 | I-I Washed   |
| 3                                                     | 3                             | 3                                             | 3                     | 9                                                 | I-I Extract  |
| 3                                                     | 3                             | 3                                             | 3                     | 9                                                 | U-U Untreated |
| 3                                                     | 3                             | 3                                             | 3                     | 9                                                 | U-U Washed   |
| 3                                                     | 3                             | 3                                             | 3                     | 9                                                 | U-U Extract  |
| 3                                                     | 3                             | 3                                             | 3                     | 9                                                 | U-U Corpse+n-C23 |
| 2                                                     | 3                             | 2                                             | 3                     | 6                                                 | U-U Extract+n-C23 |
**Supplementary Table 3.** Cuticular hydrocarbons of *Myrmica scabrinodis* with their relative proportion (±SEM) from Csata et al. [1].

| Peak | Hydrocarbon          | Relative proportion (±SEM) |
|------|----------------------|-----------------------------|
| 1    | n-C21                | 0.65 (±0.41)                |
| 2    | 3-MeC21              | 0.60 (±0.34)                |
| 3    | n-C22                | 0.71 (±0.27)                |
| 4    | 3-MeC22              | 0.58 (±0.22)                |
| 5    | X-C23:1              | 1.09 (±0.21)                |
| 6    | n-C23                | 12.71 (±1.81)               |
| 7    | 7-MeC23              | 0.14 (±0.10)                |
| 8    | 5-MeC23              | 0.06 (±0.03)                |
| 9    | 3-MeC23              | 15.21 (±1.21)               |
| 10   | X-C24:1              | 0.29 (±0.11)                |
| 11   | X'-C24:1             | 0.02 (±0.03)                |
| 12   | n-C24                | 1.12 (±0.24)                |
| 13   | 8-MeC24              | 0.51 (±0.24)                |
| 14   | X,Y-C25:2            | 0.11 (±0.05)                |
| 15   | 4-MeC24              | 16.06 (±4.65)               |
| 16   | X',Y'-C25:2          | 35.17 (±3.95)               |
| 17   | X-C25:1              | 2.05 (±0.42)                |
| 18   | X'-C25:1             | 0.13 (±0.06)                |
| 19   | n-C25                | 6.44 (±0.82)                |
| 20   | 5-MeC25              | 0.62 (±0.32)                |
| 21   | 3-MeC25              | 1.94 (±0.41)                |
| 22   | 5,17 di-MeC25        | 0.11 (±0.06)                |
| 23   | n-C26                | 0.12 (±0.05)                |
| 24   | 3,9-diMeC25          | 0.09 (±0.05)                |
| 25   | X,Y-C27:2            | 0.08 (±0.07)                |
| 26   | X-C27:1              | 0.10 (±0.04)                |
| 27   | X'-C27:1             | 0.85 (±0.20)                |
| 28   | n-C27                | 0.57 (±0.13)                |
| 29   | C28 + unknown        | 0.03 (±0.01)                |
| 30   | X-C29:1              | 0.43 (±0.26)                |
| 31   | n-C29                | 0.49 (±0.19)                |
| 32   | 15-, 13-, 11-MeC29   | 0.15 (±0.10)                |
| 33   | 5,17-diMeC29         | 0.14 (±0.11)                |
| 34   | C30 + unknown        | 0.02 (±0.01)                |
| 35   | X-C31:1              | 0.40 (±0.24)                |
Supplementary Figure 1. The hydrocarbon profiles of an uninfected *Myrmica scabrinodis* worker (in grey) and a dummy (in red). The dummy was an uninfected worker washed 5 times with hexane.
Supplementary results

DNA barcoding

The consensus tree obtained allowed us to state that population included in the present study undoubtedly belonged to *M. scabrinodis* species, and also fell into a single lineage indicated by some authors as *M. scabrinodis* type A [1, 2]. The obtained sequences will be published in a further work in preparation.

Supplementary Figure 2. Neighbor-joining consensus tree based on COI sequence data built on Tamura-Nei genetic distances. Branch lengths reflect the genetic distances and major branches have posterior probabilities assigned to them.

Behavioural assays
**Supplementary Table 4.** Summary of the outputs of statistical analyses of interaction assays reported in the main text: (a) GLMMs with colony identifier (Col ID) as random factor, (b) GLMs with treatment and Col ID as fixed factors. RD – Residual Deviation. Fig. refers to the figure where the comparison is featured. See *Statistics and reproducibility* sub-chapter in the *Materials and methods* chapter for further information.

| COMPARISONS                        | GLMM  | GLM     | N  | Fig |
|------------------------------------|-------|---------|----|-----|
|                                    |       |         |    |     |
| U-I corpse vs U-I extract          | $z = 0.6, p = 0.54^*$ | RD = 22.38 | 18 | 2b,e |
|                                    |       | p = 0.54 |    |     |
| U-U corpse vs U-U extract          | $z = -0.9, p = 0.36^*$ | RD = 15.76 | 27 | 2a,d |
|                                    |       | p = 0.36 |    |     |
| I-I corpse vs I-I extract          | $z = -1.96, p = 0.051^*$ | RD = 12.10 | 27 | 2h,k |
|                                    |       | p = 0.03 |    |     |
| I-U corpse vs I-U extract          | $z = -0.85, p = 0.39$ | RD = 21.45 | 18 | 2g,j |
|                                    |       | p = 0.26 |    |     |
| I-I corpse vs U-U corpse           | $z = 3.7, p = 0.0002^*$ | RD = 21.52 | 36 | 2a,h |
|                                    |       | p = 0.001 |    |     |
| I-I corpse vs U-I corpse           | $z = 2.66, p = 0.007^*$ | RD = 19.37 | 27 | 2b,h |
|                                    |       | p = 0.002 |    |     |
| U-U corpse vs I-U corpse           | $z = 1.83, p = 0.06^*$ | RD = 22.58 | 27 | 2a,g |
|                                    |       | p = 0.05  |    |     |
| I-U corpse vs I-I corpse           | $z = 2.3, p = 0.02^*$ | RD = 14.59 | 27 | 2g,h |
|                                    |       | p = 0.01  |    |     |
| U-U corpse vs U-I corpse           | $z = 1.39, p = 0.16^*$ | RD = 27.36 | 27 | 2a,b |
|                                    |       | p = 0.15  |    |     |
| U-U extract vs I-I extract         | $z = 2.94, p = 0.003^*$ | RD = 6.34  | 18 | 2d,k |
|                                    |       | p = 0.01  |    |     |
| U-I extract vs U-U extract         | $z = 2.49, p = 0.01^*$ | RD = 10.79 | 18 | 2d,e |
|                                    |       | p = 0.008 |    |     |
| U-U corpse vs U-U+n-C23            | $z = 3.27, p = 0.001^*$ | RD = 18.83 | 30 | 2a,c |
|                                    |       | p = 0.001 |    |     |
| I-U corpse vs I-U+n-C23            | $z = 1.49, p = 0.13$ | RD = 12.22 | 15 | 2g,i |
|                                    |       | p = 0.05  |    |     |
| U-U extract vs U-U+n-C23           | $z = -3.87, p = 0.001^*$ | RD = 11.63 | 21 | 2d,f |
|                                    |       | p = 0.001 |    |     |
| I-U extract vs I-U+n-C23           | $z = -2.13, p = 0.03^*$ | RD = 20.8  | 15 | 2j,l |
|                                    |       | p = 0.01  |    |     |

* singularity issue
**Supplementary Table 5.** Statistical analysis of interaction assays: reaction of infected and uninfected workers to hexane-washed dummies supplemented with cuticular extracts. (a) GLMMs with colony identifier (Col ID) as random factor, (b) GLMs with treatment and Col ID as fixed factors. RD – Residual Deviation. See Statistics and reproducibility sub-chapter in the Materials and methods chapter for further information.

| COMPARISONS                  | GLMM                      | GLM          | N  |
|------------------------------|---------------------------|--------------|----|
| I-I extract vs I-U extract   | \( z = 1.69, \ p = 0.09^* \) RD = 18.99 RD = 12.24 | RD = 12.09 | 18 |
| I-U extract vs U-U extract   | \( z = 1.35, \ p = 0.17^* \) RD = 14.65 RD = 7.65 | RD = 12.09 | 18 |
| I-I extract vs U-I extract   | \( z = 0.35, \ p = 0.72^* \) RD = 15.12 RD = 12.09 | RD = 12.09 | 18 |

* singularity issue

Infected workers did not differentiate between dummies with added \( n\)-C23 and hexane-washed dummies treated with the cuticular extracts of uninfected workers + \( n\)-C23 (Supplementary Table 6; Figure 2i,l). This was not the case though in uninfected live individuals (Supplementary Table 6; Figure 2c,f).

**Supplementary Table 6.** Statistical analysis of interaction assays: reaction of infected and uninfected workers to dummies with added \( n\)-C23 vs hexane-washed dummies supplemented with cuticular extracts and \( n\)-C23. (a) GLMMs with colony identifier (Col ID) as random factor, (b) GLMs with treatment and Col ID as fixed factors. RD – Residual Deviation. See Statistics and reproducibility sub-chapter in the Materials and methods chapter for further information.

| COMPARISONS                  | GLMM                      | GLM          | N  |
|------------------------------|---------------------------|--------------|----|
| I-U + \( n\)-C23 vs I-U extract + \( n\)-C23 | \( z = 0.63, \ p = 0.52^* \) RD = 11.55 RD = 9.93 | RD = 9.93 | 12 |
| U-U + \( n\)-C23 vs U-U extract + \( n\)-C23 | \( z = 1.75, \ p = 0.07^* \) RD = 14.7 RD = 13.7 | RD = 13.7 | 24 |

* singularity issue
Within colony aggression (Control experiments)

Supplementary Figure 3. Aggression indices resulting from within colony interaction assays between live infected *M. scabrinodis* workers and different types of dummies: (a) infected untreated corpses from the same colonies (yellow); (b) infected washed corpses from the same colonies (blue); (c) dummy + infected CHC from the same colonies (red).
Supplementary Figure 4. Aggression indices resulting from within colony interaction assays between live uninfected *M. scabrinodis* workers and different types of dummies: (a) uninfected untreated corpses from the same colonies (yellow); (b) uninfected washed corpses from the same colonies (blue); (c) dummy + infected CHC from the same colonies (red); (d) uninfected corpse + n-C23 from the same colonies (dark red); (e) dummy + uninfected CHC + n-C23 (orange) from the same colonies.
References

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