Table 4-1. The preferences of pupal parasitoid *Spalangia cameroni* and *Muscidifurax raptor* to odors emitted from substrate consisting of 3-d-old pine shavings mixed with equine dung and urine with and without interactions with house flies developed from eggs to 3rd instar in a Y-tube olfactometer and included odor treatments of (1) substrate with the house flies had developed from eggs to 3rd instar removed (2) substrate with house flies that had developed from eggs to 3rd instar, (3) substrate without developing flies, (4) humidified and purified clean air, (5) 3rd instar house flies that had been removed from the substrate and washed with distilled water, (6) substrate with house flies that have developed to puparia from eggs placed on the substrate, (7) substrate that had house flies that had developed to puparia from eggs removed, (8) house fly puparia removed from the substrate and washed with distilled water.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | Odor 1 | N | Odor 2 | N | Total N | *X2* | *P1* |
| *Spalangia cameroni* | (1) Substrate, larvae removed | 80 | (4) Control | 20 | 100 | 36.00 | <0.0001\*\* |
|  Substrate, larvae removed | 70 | (5) Washed larvae | 30 | 100 | 16.00 | <0.0001\*\* |
|  | (2) Substrate with larvae | 57 | Substrate, larvae removed | 43 | 100 | 1.96 | 0.5485 |
|  | (3) Substrate | 57 | Washed larvae | 43 | 100 | 1.96 | 0.5485 |
|  |  |  |  |  |  |  |  |
| *Muscidifurax raptor* |  Substrate with larvae | 36 | (8) Washed puparia | 64 | 100 | 7.84 | 0.0051\* |
| (6) Substrate with puparia | 63 |  Substrate | 37 | 100 | 6.76 | 0.0093\* |
|  | (7) Substrate, puparia removed | 40 |  Washed puparia | 60 | 100 | 4.00 | 0.0455\* |

1Asterisks indicate significant differences within a choice test: *X2* test where *\*P <* 0.05, \*\* *P <* 0.001

Table 4-2. Comparison of the latency (time to choice) of *Spalangia cameorni* and *Muscidifurax raptor* to odors emitted from substrate consisting of 3-d-old pine shavings mixed with equine dung and urine and developing house flies. Preferences were tested using a Y-tube olfactometer and included odor treatments of (1) humidified and purified clean air, (2) substrate without developing flies, (3) substrate with 30 house flies developed to 3rd instar from eggs placed on the substrate, (4) substrate with 30 house flies developed to puparia from eggs, (5) 3rd instar house flies that had been removed from the substrate and washed with distilled water, (6) house fly puparia removed from the substrate and washed with distilled water (7) substrate that had house flies that had developed to puparia from eggs removed.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Odor 1 | Odor 2 | *Spalangia cameroni* time to response (sec)Mean + SE1 |  | *Muscidifurax raptor*time to response (sec)Mean + SE1 |
| (1) Control | Control | 83.18 + 1.14ab |  | 72.44 + 1.18a |
| (2) Substrate | Control | 89.13 + 1.17ab |  |  66.07 + 1.17a |
| (3) Substrate with larvae | Control | 83.18 + 1.10ab |  |  102.33 + 1.12a |
| (4) Substrate with puparia | Control | 93.33 + 1.09ab | \*2 | 66.07 + 1.13a |
| (5) Washed larvae | Control |  107.15 + 1.06ab |  | 91.20 + 1.10a |
| (6) Washed puparia | Control |  112.20 + 1.09a | \* | 74.13 + 1.16a |
| (7) Substrate, puparia removed | Control |  91.20 + 1.10ab | \* | 58.88 + 1.14a |
|  Substrate with larvae | Substrate with puparia |  79.43 + 1.09ab |  | 87.09 + 1.21a |
|  Washed larvae | Washed puparia | 102.33 + 1.09ab | \* | 69.18 + 1.16a |
|  Substrate | Substrate with larvae |  70.79 + 1.08b |  | 89.13 + 1.11a |
|  |  |  |  |  |
| Mean latency time across all odor treatments |  90.37 + 1.03 | \* | 77.09 + 1.04 |

1Means in a column followed by the same capital letter are not significantly different (Tukey’s HSD test, α =0.05).

2 Paired comparisons between *S. cameroni* and *M. raptor* with an asterisk are statistically significant (Student’s *t-*test, α =0.05)

**b**

**a**

**a**

**b**

**b**

**a**

**b**

**a**

(2) Substrate

(3) Substrate with larvae

(4) Substrate with puparia

(5) Washed larvae

(6) Washed puparia

(7) Substrate, puparia removed

Substrate with larvae

Washed larvae

Substrate with larvae

 (1) Clean air

Clean air

Clean air

Clean air

Clean air

Clean air

Substrate with puparia

Clean air

Substrate

Washed puparia

Clean air

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Responses of *Spalangia cameroni* Responses of *Mucsidifurax raptor*

Figure 4-1. Comparison of the preferences of pupal parasitoids *Spalangia cameroni* and *Muscidifurax raptor* for odors emitted from 30 g of substrate consisting of 3-d-old pine shavings mixed with equine dung and urine and developing house flies. Preferences were tested using a Y-tube olfactometer and included odor treatments of (1) humidified and purified clean air, (2) substrate without developing flies, (3) substrate with 30 house flies developed to 3rd instar from eggs placed on the substrate, (4) substrate with 30 house flies developed to puparia from eggs placed on the substrate, (5) 3rd instar house flies that had been removed from the substrate and washed with distilled water, (6) house fly puparia removed from the substrate and washed with distilled water (7) substrate that had house flies that had developed to puparia from eggs removed. The bars indicate the number of wasps choosing either odor source within 5 min from the start of the experiment. The total number responding was 100 for all treatments. Asterisks indicate significant differences within a choice test: *X2* test where *\*P <* 0.05, \*\* *P <* 0.001. Letters indicate significant differences in responses between species in a specific odor combination (Fisher’s Exact Test, *P <* 0.05)