Supplementary information

Figure S1. Bayesian phylogenetic estimate of relationships within the Echinostomatidae, showing strong support all samples belong to*Echinoparyphium* lineage 3. The tree was estimated from a Bayesian 50% majority-rule consensus phylogram composed from sequences of the internal transcribed spacer region [ITS-1] of ribosomal DNA gene fragment (total of 491 bp). Nodes supported by ≥ 95% posterior probability are considered highly supported. Sample names follow those given in the supplementary table S1.

|  |
| --- |
| Supplementary Table S1. GenBank accession numbers for all echinostome sequences used in this study. |
| **Species** | **Sample name** | **ITS** |
| *Echinostoma caproni* |  | GQ463131 |
|  |  | U58098 |
| *Echinostoma paraensei* |  | AF336232 |
|  |  | U58100 |
| *Echinostoma revolutum* |  | GQ463128 |
|  |  | GQ463130 |
| *Echinostoma* sp. 1 |  | U58103 |
| *Echinostoma trivolvis* |  | AF067852 |
|  |  | GQ463126 |
|  |  | AF067851 |
|  |  | U58097 |
|  |  | GQ463127 |
| *Echinoparyphium ellisi* |  | AF026791 |
| *Echinoparyphium* lineage 1 |  | GQ463135 |
| *Echinoparyphium* lineage 2 |  | GQ463136 |
|  |  | GQ463137 |
| *Echinoparyphium* lineage 3 |  | GQ463138 |
|  | ICP 1 | **This study** |
|  | ICP 2 | **This study** |
|  | ICP 3 | **This study** |
|  | PWA 1 | **This study** |
|  | PWA 2 | **This study** |
|  | PWA 3 | **This study** |
| *Echinoparyphium recurvatum* |  | AY168931 |
| *Echinostoma robustum* |  | GQ463132 |
|  |  | GQ463133 |
| *Euparyphium albuferensis* |  | AJ564384 |
| *Hypoderaeum conoideum* |  | AJ564385 |
| *Hypoderaeum* lineage 1 |  | GQ463134 |
| **Outgroup taxa** |  |  |
| *Echinostoma hortense* |  | U58101 |
| *Isthmiophora melis* |  | AY168932 |
| *Paryphostomum radiatum* |  | AY245708 |
| *Petasiger phalacrocoracis* |  | AY245709 |

Figure S2. Pairwise comparisons (Tukey’s test) within population across pesticide treatments for carbaryl. Gray shading represent values for ICP and white represents values for PWA.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Carbaryl 5 | Carbaryl 15 | Carbaryl 25 | Carbaryl 35 | Carbaryl 55 | Carbaryl 70 |
| Carbaryl 5 | - | 0.418 | 1.000 | 1.000 | 1.000 | 1.000 |
| Carbaryl 15 | 1.000 | - | 1.000 | 1.000 | 1.000 | **0.035** |
| Carbaryl 25 | 1.000 | 1.000 | - | 1.000 | 1.000 | 0.276 |
| Carbaryl 35 | 1.000 | 1.000 | 1.000 | - | 1.000 | 1.000 |
| Carbaryl 55 | 1.000 | 1.000 | 1.000 | 1.000 | - | 0.941 |
| Carbaryl 70 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | - |

Figure S3. Pairwise comparisons (Tukey’s test) within population across pesticide treatments for malathion Gray shading represent values for ICP and white represents values for PWA.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Malathion 15 | Malathion 25 | Malathion 35 | Malathion 45 | Malathion 55 | Malathion 65 |
| Malathion 15 | - | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 |
| Malathion 25 | 1.000 | - | 1.000 | 1.000 | 1.000 | 1.000 |
| Malathion 35 | **0.019** | 0.784 | - | 1.000 | 1.000 | 1.000 |
| Malathion 45 | 0.074 | 1.000 | 1.000 | - | 1.000 | 1.000 |
| Malathion 55 | 0.074 | 1.000 | 1.000 | 1.000 | - | 1.000 |
| Malathion 65 | **<0.001** | **0.010** | 1.000 | 0.464 | 0.464 | - |

Figure S4. Pairwise comparisons (Tukey’s test) within population across pesticide treatments for cypermethrin Gray shading represent values for ICP and white represents values for PWA.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Cypermethrin 1 | Cypermethrin 3 | Cypermethrin 5 | Cypermethrin 10 | Cypermethrin 30 | Cypermethrin 50 |
| Cypermethrin 1 | - | 1.000 | 1.000 | 0.563 | 1.000 | 1.000 |
| Cypermethrin 3 | **0.003** | - | 1.000 | 1.000 | 1.000 | 1.000 |
| Cypermethrin 5 | **0.003** | 1.000 | - | 1.000 | 1.000 | 1.000 |
| Cypermethrin 10 | **0.002** | 1.000 | 1.000 | - | 1.000 | 0.131 |
| Cypermethrin 30 | **0.002** | 1.000 | 1.000 | 1.000 | - | 1.000 |
| Cypermethrin 50 | **0.002** | 1.000 | 1.000 | 1.000 | 1.000 | - |

Figure S5. Pairwise comparisons (Tukey’s test) within population across pesticide treatments for permethrin. Gray shading represent values for ICP and white represents values for PWA.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Permethrin 1 | Permethrin 3 | Permethrin 5 | Permethrin 10 | Permethrin 30 | Permethrin 50 |
| Permethrin 1 | - | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 |
| Permethrin 3 | 1.000 | - | 1.000 | 1.000 | 1.000 | 1.000 |
| Permethrin 5 | 1.000 | 1.000 | - | 1.000 | 1.000 | 1.000 |
| Permethrin 10 | 1.000 | 1.000 | 1.000 | - | 1.000 | 1.000 |
| Permethrin 30 | 1.000 | 1.000 | 1.000 | 1.000 | - | 1.000 |
| Permethrin 50 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | - |

Figure S6. Pairwise comparisons (Tukey’s test) within population across pesticide treatments for imidacloprid. Gray shading represent values for ICP and white represents values for PWA.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Imidacloprid 2 | Imidacloprid 4 | Imidacloprid 8 | Imidacloprid 16 | Imidacloprid 32 | Imidacloprid 64 |
| Imidacloprid 2 | - | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 |
| Imidacloprid 4 | 1.000 | - | 1.000 | 1.000 | 1.000 | 1.000 |
| Imidacloprid 8 | 1.000 | 1.000 | - | 1.000 | 1.000 | 1.000 |
| Imidacloprid 16 | - | - | - | - | 1.000 | 1.000 |
| Imidacloprid 32 | 1.000 | 1.000 | 1.000 | - | - | 1.000 |
| Imidacloprid 64 | 1.000 | 1.000 | 1.000 | - | 1.000 | - |

Figure S7. Pairwise comparisons (Tukey’s test) within population across pesticide treatments for thiamethoxam. Gray represents values for ICP and white represents values for PWA.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Thiamethoxam 2 | Thiamethoxam 4 | Thiamethoxam 8 | Thiamethoxam 16 | Thiamethoxam 32 | Thiamethoxam 64 |
| Thiamethoxam 2 | - | 1.000 | 0.086 | **<0.001** | **<0.001** | **<0.001** |
| Thiamethoxam 4 | 1.000 | **-** | **0.043** | **<0.001** | **<0.001** | **<0.001** |
| Thiamethoxam 8 | 1.000 | 1.000 | - | 0.086 | 0.086 | 0.170 |
| Thiamethoxam 16 | 0.182 | 1.000 | 1.000 | - | 1.000 | 1.000 |
| Thiamethoxam 32 | 0.087 | 1.000 | 1.000 | 1.000 | - | 1.000 |
| Thiamethoxam 64 | 1.000 | 1.000 | 1.000 | 0.925 | 0.489 | - |