**Table 1.** Numbers and per cent of *B. s. goniomphalos* samples categorized by the status of trematode infection and sampling years and seasons.

|  |  |  |
| --- | --- | --- |
| Factors | No Snails (n) | % |
| Total no. of snails | 59,727 | 100.00 |
| Positive for trematodes | 6,134 | 10.27 |
| Negative | 53,593 | 89.73 |
| Years |  |  |
| 2010 | 16,977 | 28.42 |
| 2011 | 15,548 | 26.03 |
| 2012 | 14,021 | 23.48 |
| 2013 | 13,181 | 22.07 |
| Seasons |  |  |
| Hot-dry | 19,362 | 32.42 |
| Rainy | 23,273 | 38.97 |
| Cool-dry | 17,092 | 28.62 |

**Table 2.** Associations between prevalence of combined trematode infection and environmental (season, rainfall, irrigated water) and biological factors (size of snail). Data presented were analyzed by logistic regression model showing crude (cOR) and adjusted (aOR) odds ratios with 95% confidence interval and p-values.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Factors | No. snail examined | No. snail infected (%) | cOR | aOR | | 95% CI | *P*-value | |
| Yeara |  |  |  |  |  | | |  |
| 2010 | 16,977 | 1,182 (7.0) | Ref | Ref |  | | |  |
| 2011 | 15,548 | 1,156 (7.4) | 1.073 | 1.053 | 0.967-1.148 | | | 0.233 |
| 2012 | 14,021 | 1,942 (13.9) | 2.148\*\*\* | 1.903 | 1.761-2.057 | | | **<0.001** |
| 2013 | 13,181 | 1,854 (14.1) | 2.187\*\*\* | 1.728 | 1.595-1.871 | | | **<0.001** |
| Seasonb |  |  |  |  |  | | |  |
| Hot-dry | 19,362 | 1,289 (6.7) | Ref | Ref |  | | |  |
| Rainy | 23,273 | 1,730 (7.4) | 1.126\*\* | 0.954 | 0.884-1.030 | | | 0.229 |
| Cool-dry | 17,092 | 3,115 (18.2) | 3.125\*\*\* | 2.779 | 2.589-2.983 | | | **<0.001** |
| Rainfallc |  |  |  |  |  | | |  |
| Low (0-150 mm) | 35,950 | 4,386 (12.2) | Ref | Ref |  | | |  |
| Medium (151-300 mm) | 13,714 | 1,231 (9.0) | 0.710\*\*\* | 0.947 | 0.877-1.023 | | | 0.166 |
| High (> 300 mm) | 10,063 | 517 (5.1) | 0.390\*\*\* | 0.577 | 0.522-0.639 | | | **<0.001** |
| Irrigation waterd |  |  |  |  |  | | |  |
| Low (0-500,000 m3) | 24,155 | 1,621 (6.7) | Ref | Ref |  | | |  |
| Medium (500,001-1,000,000 m3) | 27,441 | 3,445 (12.6) | 1.996\*\*\* | 1.579 | 1.475-1.692 | | | **<0.001** |
| High (1,000,001-1,500,000 m3) | 8,131 | 1,068 (13.1) | 2.102\*\*\* | 1.395 | 1.263-1.541 | | | **<0.001** |
| Size of snail (Shell length) e |  |  |  |  |  | | |  |
| Small (<8.00 mm) | 847 | 219 (25.9) | Ref | Ref |  | | |  |
| Medium (8.01-10.00 mm) | 3,422 | 1,388 (40.6) | 1.957\*\*\* | 2.212 | 1.857-2.635 | | | **<0.001** |
| Large (> 10.01 mm) | 1,953 | 1,207 (61.8) | 4.640\*\*\* | 5.677 | 4.692-6.869 | | | **<0.001** |

Adjusted odds ratio by a: season, b: year, c: year, season and irrigated water, d: year, season and rainfall, e: year and season.

\*\*, \*\*\* indicates cORs with a significance level of *P* < 0.01 and *P* < 0.001 respectively.

**Table 3.** Seasonal and yearly prevalence of trematode diversity in *B. s. goniomphalos* in Sakon Nakhon Province, Thailand. Data shown are number and percent positive snails.

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Type of cercariae** | **2010** | | | **2011** | | | **2012** | | | **2013** | | |
| **Number of infections (%)** | | | **Number of infections (%)** | | | **Number of infections (%)** | | | **Number of infections (%)** | | |
| **Hot-dry**  (N=7,839) | **Rainy**  (N=4,989) | **Cool-dry**  (N=2,277) | **Hot-dry**  (N=4,766) | **Rainy**  (N=7,852) | **Cool-dry**  (N=3,270) | **Hot-dry**  (N=4,268) | **Rainy**  (N=5,607) | **Cool-dry**  (N=6,125) | **Hot-dry**  (N=2,489) | **Rainy**  (N=4,825) | **Cool-dry**  (N=2,349) |
| **Xiphidiocercariae**  1. Virgulate 1  2. Virgulate 2  3. Virgulate 3  4. Virgulate 4  **Pleurolophocercous cercariae**  5. *Opisthorchis viverrini* cercariae  6. Parapleurolophocercous cercariae  **Cystophorous cercariae (Hemiuridae)**  7. Cystophorous cercariae 1  8. Cystophorous cercariae 2  **Monostome cercariae**  9. Monostome  **Furcocercouscercariae**  10. Furcocercous cercariae 1  11. Furcocercous cercariae 2  12. Longifurcate-pharyngeate cercariae 1  13. Longifurcate-pharyngeate cercariae 2  **Mutabile cercariae**  14. Mutabile  **Echinostome**  15. Echinostome cercariae1  16. Echinostome cercariae 2  **Amphistome cercariae**  17. Amphistome | 35 (0.45)  -  5 (0.06)  -  -  7 (0.09)  36 (0.46)  -  -  1 (0.01)  -  1 (0.01)  -  45 (0.57)  -  -  14 (0.18) | 102 (2.04)  33 (0.66)  28 (0.56)  -  4 (0.08)  3 (0.06)  2 (0.04)  -  1 (0.02)  -  1 (0.02)  17 (0.34)  -  -  6 (0.12)  -  15 (0.30) | 85 (3.73)  7 (0.31)  89 (3.91)  -  3 (0.13)  7 (0.31)  22 (0.97)  -  -  3 (0.13)  1 (0.04)  1 (0.04)  -  4 (0.18)  2 (0.09)  -  - | 156 (3.27)  65 (1.36)  56 (1.17)  -  6 (0.13)  2 (0.04)  36 (0.76)  -  8 (0.17)  1 (0.02)  -  -  -  2 (0.04)  5 (0.10)  1 (0.02)  - | 141 (1.80)  37 (0.47)  34 (0.43)  -  52 (0.66)  -  20 (0.25)  1 (0.01)  12 (0.15)  5 (0.06)  -  12 (0.15)  2 (0.03)  -  9 (0.11)  1 (0.01)  1 (0.01) | 465 (14.22)  80 (2.45)  11 (0.34)  -  19 (0.58)  18 (0.55)  18 (0.55)  1 (0.03)  9 (0.28)  4 (0.12)  2 (0.06)  3 (0.09)  1 (0.03)  2 (0.06)  5 (0.15)  1 (0.03)  1 (0.03) | 291 (6.82)  12 (0.28)  6 (0.14)  -  7 (0.16)  1 (0.02)  7 (0.16)  2 (0.05)  32 (0.75)  3 (0.07)  -  5 (0.12)  1 (0.02)  11 (0.26)  1 (0.02)  -  1 (0.02) | 441 (7.87)  19 (0.34)  25 (0.45)  -  44 (0.78)  8 (0.14)  5 (0.09)  1 (0.02)  16 (0.29)  3 (0.05)  -  17 (0.30)  -  -  3 (0.05)  1 (0.02)  - | 965 (15.76)  40 (0.65)  63 (1.03)  -  149 (2.43)  10 (0.16)  36 (0.59)  -  76 (1.24)  -  -  13 (0.21)  -  2 (0.03)  6 (0.10)  -  - | 233 (9.36)  14 (0.56)  29 (1.17)  6 (0.24)  53 (2.13)  13 (0.52)  14 (0.56)  -  22 (0.88)  2 (0.08)  -  17 (0.68)  -  4 (0.16)  1 (0.04)  1 (0.04)  - | 347 (7.19)  4 (0.08)  54 (1.12)  13 (0.27)  42 (0.87)  1 (0.02)  13 (0.27)  -  4 (0.08)  -  -  10 (0.21)  -  -  10 (0.21)  4 (0.08)  - | 80 (3.41)  1 (0.04)  31 (1.32)  4 (0.17)  10 (0.43)  -  5 (0.21)  -  6 (0.26)  3 (0.13)  -  1 (0.04)  -  -  5 (0.21)  -  - |