Figure 1. The virulence of entomopathogenic fungi against clover root borers. Mortality (%) of adult clover root borers exposed to spores of field-isolated and commercial strains. (C) = Commercial product; (F) = Field collected.



Figure 2. Clover root borer mortality after two weeks of exposure to field collected soil inoculated with *Metarhizium anisopliae* var *anisopliae* (A4-MA).



 Figure 3. Clover root borer mortality after two weeks of exposure to field collected soil inoculated with *Beauveria bassiana* (FD).

Ta Table 1. Entomopathogenic fungi isolated from from red clover seed production fields in western Oregon.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Fields | County | *Beauveria* | *Metarhizium* | *Isaria* | *Lecanicillium* | **Grand total** |
| Field 1  | Polk | 10 | 0 | 3 | 0 | 13 |
| Field 2 | Benton | 36 | 8 | 0 | 0 | 44 |
| Field 3 | Benton | 30 | 15 | 0 | 0 | 45 |
| Field 4 | Polk | 15 | 0 | 1 | 0 | 16 |
| Field 5 | Linn | 37 | 6 | 0 | 3 | 46 |
| **Total** | 128 | 29 | 4 | 3 | **165** |

Table 2. Molecular identification of field isolated fungi isolated from 5 red clover seed production fields in western OR.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| No. | Isolat code | Identification | Percentage of similarity | e-value | Accession number of reference strains |
| ITS-1F | ITS4 | ITS-1F | ITS4 |
| 1.  | FD | *Beauveria bassiana* | 100% | 99% | 0.0 | 0.0 | KM249042 |
| 2. | W1 | *B. bassiana* | 100% | 100% | 0.0 | 0.0 | EU334677 |
| 3.  | P1SlpC | *B.bassiana* | 100% | 99% | 0.0 | 0.0 | KC753391 |
| 4. | WH3LA | *B.bassiana* | 99% | 99% | 0.0 | 0.0 | KC753398 |
| 5. | Fx-SlpC | *B.pseudobassiana* | 100% | 84% | 0.0 | 3e-99 |  NR111598 |
| 6. | A4-MA | *Metarhizium anisopliae* var *anisopliae* | 100% | 100% | 0.0 | 0.0 | EU307929 |
| 7.  | 1 SlpA | *M. robertsii* | 100% | 96% | 0.0 | 0.0 | NR132011 |
| 8. | G2LB | *M.quizhouense* | 100% | 89% | 0.0 | 1e-142 | HQ331465 |
| 9. | 14 Slpc | *M. brunneum* | 99% | 87% | 0.0 | 4e-118 | KM371261 |
| 10. | W4 | *Isaria fumosorosea* | 100% | 100% | 0.0 | 0.0 | GU354345 |
| 11. | 21-RC | *I.farinosa* | 100% | 91% | 0.0 | 6e-121 | HQ880828 |
| 12. | C5 | *Lecanicillium muscarium* | 99% | 99% | 0.0 | 0.0 | NR111096 |

Table 3. Impacts of *B.bassiana* (isolate FD) concentration on horizontal transfer of spores between clover root borer adults\*.

|  |  |  |
| --- | --- | --- |
| Concentration (spores/ml) | Number (%)of clover root borer showing dead with mycosis by *Beauveria* | Number of clover root borer dead without mycosis |
| Control | 12 (26.67) | 3 (6.67) |
| Low concentration (105)  | 12 (26.67) | 1 (2.22) |
| High concentration (9.7 x 107) | 30 (75.56) | 1 (2.22) |

\* n = 45.