# Management of Rough Sweetpotato Weevil, *Blosyrus asellus* (Coleoptera: Curculionidae) in Hawaii using insecticides


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## ABSTRACT

Sweetpotato, *Ipomoea batatas* (Olivier), is an important staple food crop in Hawaii and critical to food security in these geographically isolated islands. Production of this crop faces a new challenge from the rough sweetpotato weevil (RSW), *Blosyrus asellus,* (Coleoptera: Curculionidae). This pest was first detected on a commercial sweetpotato farm on the island of O'ahu in 2008, with subsequent detection on the island of Hawai'i in 2014. In contrast to other weevil pests of sweetpotato in Hawai'i whose immature stages (grubs) feed inside the storage roots, the grubs of rough sweetpotato weevils feed on the surfaces, severely damaging their appearance and reducing marketability. We conducted replicated trials over two cropping cycles to compare efficacy of four insecticides (Sevin, Belay, BotaniGard, Provado) against a control treatment (none). Plots treated with Sevin or Belay had significantly lower percent of damaged storage roots compared to the other three treatments. Plots treated with Belay and Sevin had fewer number of storage roots with high damage compared to other three treatments. Percent of damage was significantly higher during second cropping cycle (P<0.05), probably due to build-up of pests and the proximity of the two study areas. Based on these two field trials conducted on the Hamakua coast of Hawai'i Island, both Sevin and Belay appear to be potential candidates for the chemical control of the rough sweetpotato weevil.


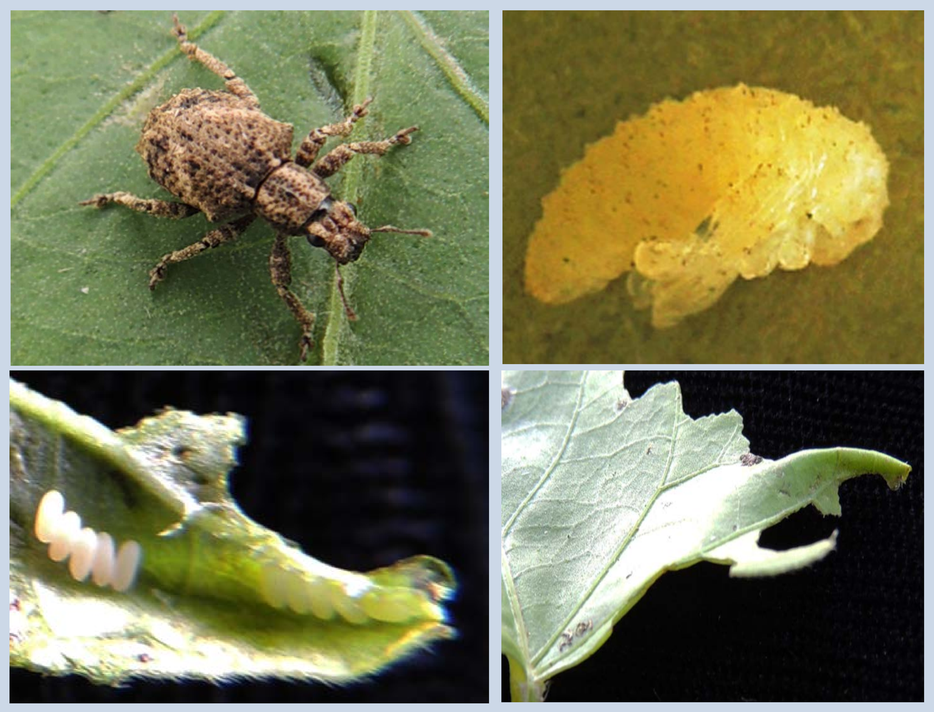

**Figure 1. Clockwise from upper left:** Adult rough sweetpotato weevil, *Blosyrus asellus* (Olivier) (Coleoptera: Curculionidae), pupa, eggs inside folded leaf tip, and eggs exposed in unrolled leaf tip. (Photographs courtesy of Grant McQuate, USDA)


**Figure 2**. A: low damage by rough sweetpotato weevil (RSW). B: medium damage by RSW. C: high damage by RSW.


## ACKNOWLEDGEMENTS

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## MATERIALS AND METHODS

- Study was conducted at Hamakua coast of Hawai'i island over two growing seasons beginning in the first week of April 2015 and August 2015 respectively.
- Thirty cuttings of sweetpotato cultivar 'Okinawan' were planted 0.3m apart on 9.1m-long beds that were spaced 1.5m apart (Figure 2).
- Beds were arranged in randomized complete block design (RCBD) with four replications.
- Effectiveness of four insecticides (including one bioinsecticide) were compared against a control treatment. The treatments were:
  1. Belay 16 WSG (Clothianidin; Valent U.S.A. Corp., Walnut Creek, CA)
  2. Sevin XLR Plus (Carbaryl; Bayer CropScience, Research Triangle Park, NC)
  3. Provado 1.6 Flowable Insecticide (Imidacloprid; Bayer Crop Science Research Triangle Park, NC)
  4. BotaniGard ES (*Beauveria bassiana* strain GHA; Laverlam Int'l Corp., Butte, MT)
  5. Control
- Belay was applied once before planting as a soil drench at the rate of 12 fl. oz./acre.
- Sevin was applied at the rate of 2 quarts/acre at 15, 45, 75, and 105 DAP.
- Provado was applied at the rate of 3.5 fl. oz. per application at 30, 60, and 90 DAP.
- Botanigard, a bioinsecticide, was applied at the rate of 40 g/3 gal. of water per application as a soil drench on each 30-foot bed at 30, 60, and 90 DAP.
- Standard agronomic practices recommended for sweetpotato were followed similarly for both seasons.
- Sweetpotatoes were harvested in August 2015 and January 2016 respectively during season 1 and 2.
- Storage roots were graded and subsequently assessed for RSW damage.
- Mean percent infestation and intensity of infestation were statistically compared.

**Figure 3**. Agricultural technicians (left to right) Dayle Tsuha, Ryan Kaneko, Mary Kaheiki, and Eric Magno planting cuttings of variety 'Okinawan'.

## RESULTS

- Overall, treatments had a significant effect on the mean percent of damaged storage roots ($P \leq 0.05$; Fig. 4).
- Plots treated with Sevin and Belay had significantly lower mean percent damage compared to other three treatments (Fig. 4).
- The effect was clearly evident in the first cropping cycle ($P \leq 0.05$) but the effect was marginal in the second cropping cycle (P=0.05).
- More storage roots were affected in the second cropping cycle compared to first cropping cycle probably due to build up of pest population during first cycle.
- Range of damage was also higher during second cropping cycle [39.0 ± 12.1 % (Sevin) to 78.1 ± 5.75 % (control)] compared to the first cropping cycle [10.68 ± 5.3 % (Sevin) to 51.94 ± 8.5 % (control)].
- Treatment effects were evident in both 'marketable' grade and off-grade sweetpotatoes (Table 1).

**Table 1**. Mean ± SEM of percentage of storage roots damaged by RSW based on the grade of storage roots. Figures denoted by same letters are not significantly different

| Treatments | RSW-damaged marketable storage roots, % | RSW-damaged off-grade storage roots, % |
|---|---|---|
| Sevin | 22.45 ± 9.1$^{A}$ | 23.14 ± 5.7$^{A}$ |
| Belay | 37.44 ± 11.2$^{A}$ | 22.37 ± 6.9$^{A}$ |
| Botanigard | 53.79 ± 9.0$^{BC}$ | 46.11 ± 7.2$^{B}$ |
| Provado | 70.60 ± 7.4$^{C}$ | 41.45 ± 5.1$^{B}$ |
| Control | 68.94 ± 7.9$^{C}$ | 45.28 ± 8.3$^{B}$ |

- Visual assessment of the severity of damage showed a similar pattern (Figs. 2, 5) ($P \leq 0.05$). Sevin and Belay significantly reduced high level damages compared to other treatments.

## CONCLUSIONS

- Based on these two field trials, insecticides Sevin or Belay appear to be effective in controlling RSW.
- These two insecticides also reduces the severity of damages on the affected roots.
- Growers might want to test these treatments to see if they are effective for RSW management under their conditions.
- Further studies are required to understand more about the biology of this invasive pest.

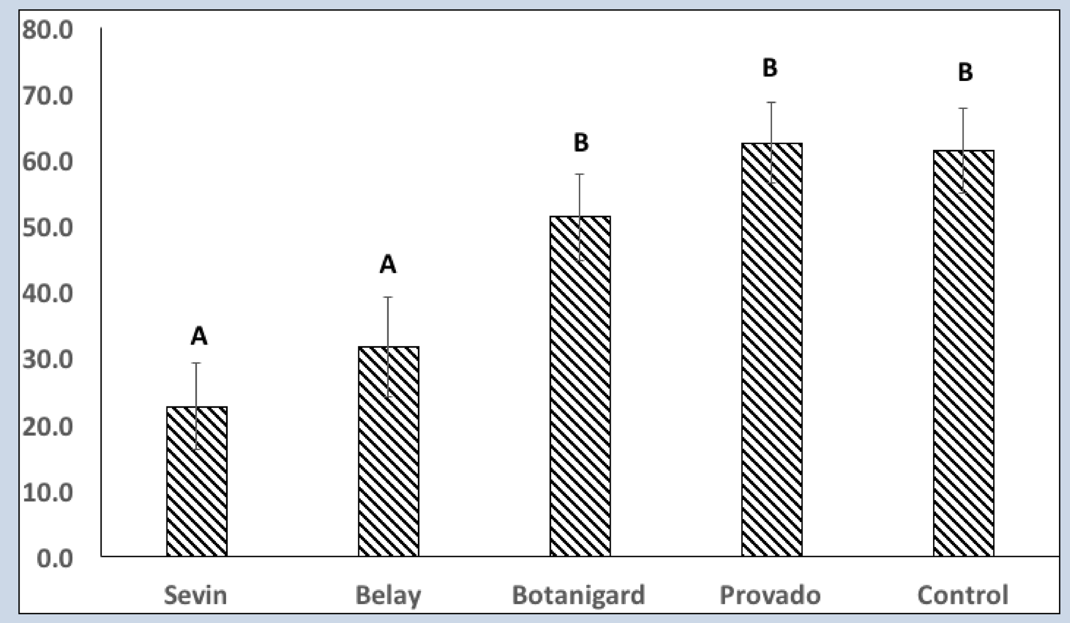


**Figure 4**. Percent of all storage roots ± SEM with characteristic damage caused by rough sweetpotato weevil (RSW) after treatment with four insecticides and a control. Bars denoted by same letters are not significantly different.

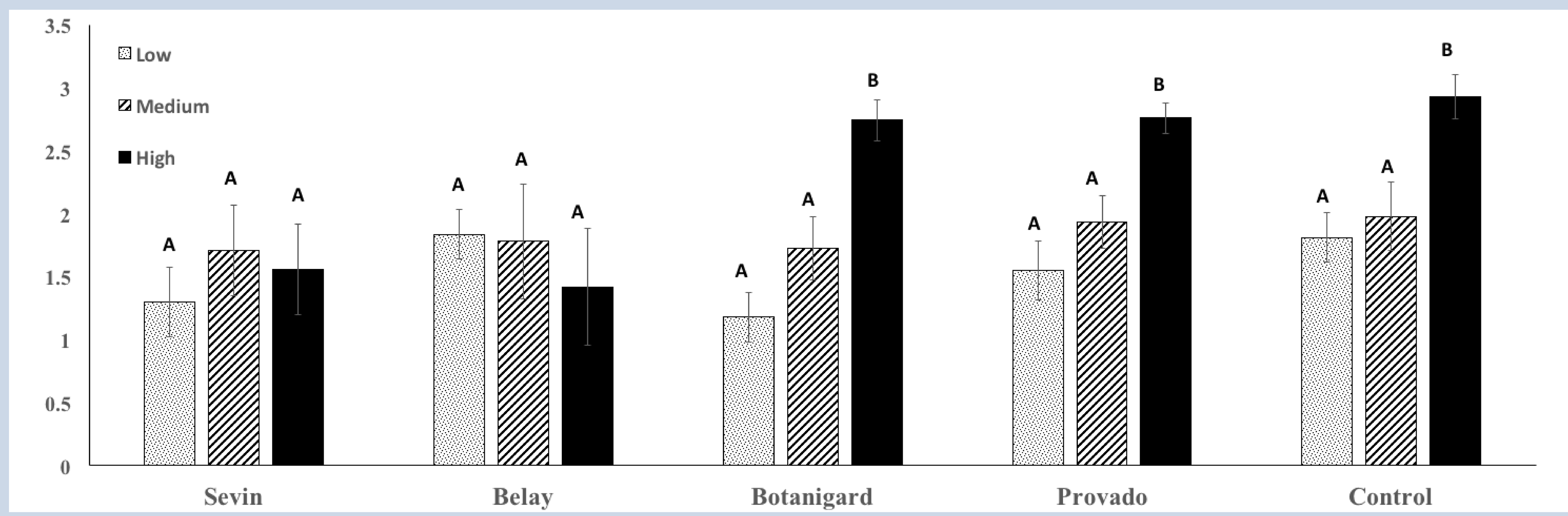


**Figure 5**. Log number of all storage roots ± SEM having low, medium, and high amounts of RSW damage under five treatments, based on visual assessment. Graphs denoted by same letters are not significantly different in the respective groups


## REFERENCES

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