Rough Sweetpotato Weevil (*Blosyrus asellus*) damage to Sweetpotato (*Ipomea batatas*) cultivars in Hawaii

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ABSTRACT

Sweetpotato, *Ipomoea batatas* (L.) Lam., production has increased in recent years in Hawaii and, based on 2011 data, was the 10th highest value crop in Hawaii. Production constraints have included three insect pests of quarantine significance as well as several diseases. In 2008 a new insect pest of quarantine significance, the rough sweetpotato weevil, *Blosyrus asellus* (Olivier) (Coleoptera: Curculionidae), was found on a commercial sweetpotato farm on the island of Oahu, with subsequent detection on the island of Hawaii in 2014. In contrast to other weevil pests of sweetpotato in Hawaii where the immature stage (grubs) feed inside the root, rough sweetpotato weevil grubs form grooves or channels on the root surface as they feed. At present, this pest is not known to occur on the U. S. Mainland. Ten sweet potato cultivars were evaluated for yield, and resistance to pests and diseases found along the Hamakua Coast of Hawaii Island. These cultivars included three from Hawaii ('Okinawan', 'Mokuau', and 'Kona B') and seven from the USDA Germplasm Repository in Griffin, Georgia ('Beauregard', 'Darby', 'Pelican Processor', 'Picadito', '392', 'L329', and 'ACC208'). Cuttings of these cultivars were planted in plots at a spacing of 1.5 m between rows and 0.3 m within rows, with 30 cuttings per plot. Due to limited number of cuttings, treatments of cultivars were replicated over time, with the first planting on 8 May 2014 and the second planting on 1 October 2014. Root damage by rough sweetpotato weevils was first observed at the harvest of the first planting. Traps designed to monitor the presence of rough sweetpotato weevil adults in each sweetpotato cultivar were deployed near the time of harvest of the second planting. Average trap catch across all ten varieties was 1.4 weevils/trap/day (range: 0.62 – 2.5 weevils/trap/day). Plants were harvested at 5 months and 4.5 months after planting, respectively. Marketable yields differed significantly among cultivars, ranging from 263 to 15,132 kg/ha. There were also significant differences among cultivars in root damage by rough sweetpotato weevil, with injury ranging from 23 to 100% of marketable yields. Root damage results suggest that resistance to damage by rough sweetpotato weevils may vary among sweetpotato cultivars.

METHODS

Ten sweetpotato cultivars (Table 1) were selected based on results of earlier field trials along Hamakua Coast of Hawaii Island. They were planted at a spacing of 0.3 m within rows and 1.5 m between rows, with 30 cuttings per plot. One block was planted on 8 May 2014 and the second block planted on 1 October 2014 . The blocks were harvested on 3 October 2014 and 18 February 2015. Statistical analysis was conducted on yield and percent damage due to rough sweetpotato weevil using Multiple Comparisons with the Best (Westfall et al., 1999).

Table 1. Ten cultivars of sweet potato (*Ipomoea batatas*) planted in two blocks replicated over time.

Cultivar	Country of Origin
531094	Guatemala
573309	Papua New Guinea
573330	Solomon Islands
Beauregard	Louisiana, U.S.A.
Darby	Louisiana, U.S.A.
Kona-B	Hawaii, U.S.A.
Mokuau	Hawaii, U.S.A.
Okinawan	Okinawa, Japan
Pelican Processor	Louisiana, U.S.A.
Picadito	Cuba/ Florida, U.S.A.

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RESULTS

Rough sweetpotato weevil (*Blosyrus asellus*) (adult [Fig. 1], eggs [Fig. 2], pupa [Fig. 3]), a new, invasive pest of sweetpotato in Hawaii [Fig. 4], was found to cause extensive damage in the first planting of this cultivar trial. And the damage continued in the second planting. Table 2 presents the average marketable fresh weight, total fresh weight, percentage of harvest that was marketable and the percentage of the marketable yield that was damaged by the feeding of the immature stages of the rough sweetpotato weevil. Typical root damage caused by the feeding of immature rough sweetpotato weevils is shown in Figure 5. Adult rough sweetpotato weevils feed on the margins of sweetpotato leaves, the feeding notches (Fig. 6) providing a sign of the presence of the pest. Adult presence was also detected using green light traps baited with a leaf and a freshly cut sweetpotato root section (Okinawan cultivar) (Fig. 7). The cultivar-specific trap catch rate, however, did not show a high level of correlation to the observed root damage (r-square = 0.060). Research is ongoing to develop control methods for the rough sweetpotato weevil.

Figure 1. Adult rough sweetpotato weevil, *Blosyrus asellus* (Olivier) (Coleoptera: Curculionidae).

Figure 2. Eggs of rough sweetpotato weevil inside folded leaf tip (above left). Eggs shown in unrolled leaf tip (above right).

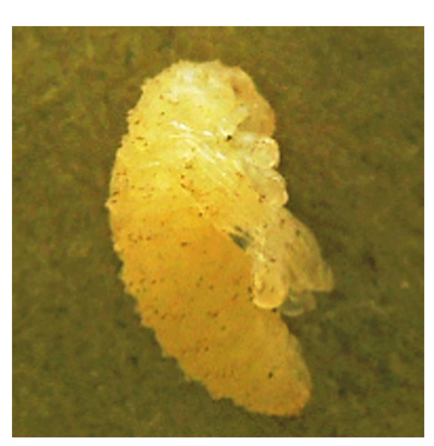

Figure 3. Pupa of rough sweetpotato weevil.

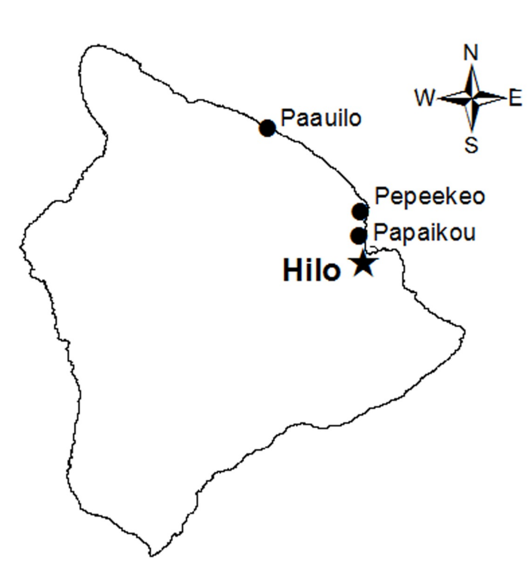

Figure 4. Location of rough sweetpotato weevil along Hamakua Coast of Hawaii Island.

Figure 5. Rough sweetpotato weevil damage to 'Okinawan' purple sweetpotato. Note: damage by larvae of rough sweetpotato weevil is confined to surface of root.

Figure 6. Feeding damage on leaves by adult rough sweetpotato weevil. There is a characteristic notch on edges of leaves.

REFERENCES

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Westfall, P.H., R.D. Tobias, D. Rom, R.D. Wolfinger, and Y. Hochberg. **1999**. Multiple comparisons and multiple tests: Using SAS. SAS Institute Inc., Cary, NC.

Table 2. Marketable fresh weights, total fresh weights, percentage of marketable yields, and percentage of rough sweetpotato (SP) weevil damage within marketable yields.

Cultivar	Marketable Fresh Wt., kg/ha	Total Fresh Wt., kg/ha	Marketable, %	Rough SP Weevil damage, % of Marketable Yield
531094	3103b	6124b	51a	45a
573309	15132a	23824a	64a	74a
573330	9198b	18341a	51a	23b
Beauregard	13733a	23937a	57a	23b
Darby	3920b	8887b	44a	27b
Kona-B	263b	2199b	7b	100a
Mokuau	1140b	2828b	26a	27b
Okinawan	3175b	5473b	61a	41b
Pelican Processor	7811b	13998b	56a	41b
Picadito	7840b	12538b	62a	78a

Significant differences were found between cultivars in marketable fresh weight yields, total fresh weight yields, percentage of marketable yields, and percentage of rough sweet potato weevil damage (relative to marketable yield). Cultivar 573309 from Papua New Guinea had the highest marketable fresh weight yield, but it also had the third highest percentage of damage due to rough sweetpotato weevil. Cultivar Beauregard had the highest total fresh weight yield and the lowest damage due to rough sweetpotato weevil. Cultivar Kona B had the lowest yields and the greatest rough sweetpotato damage to marketable roots.

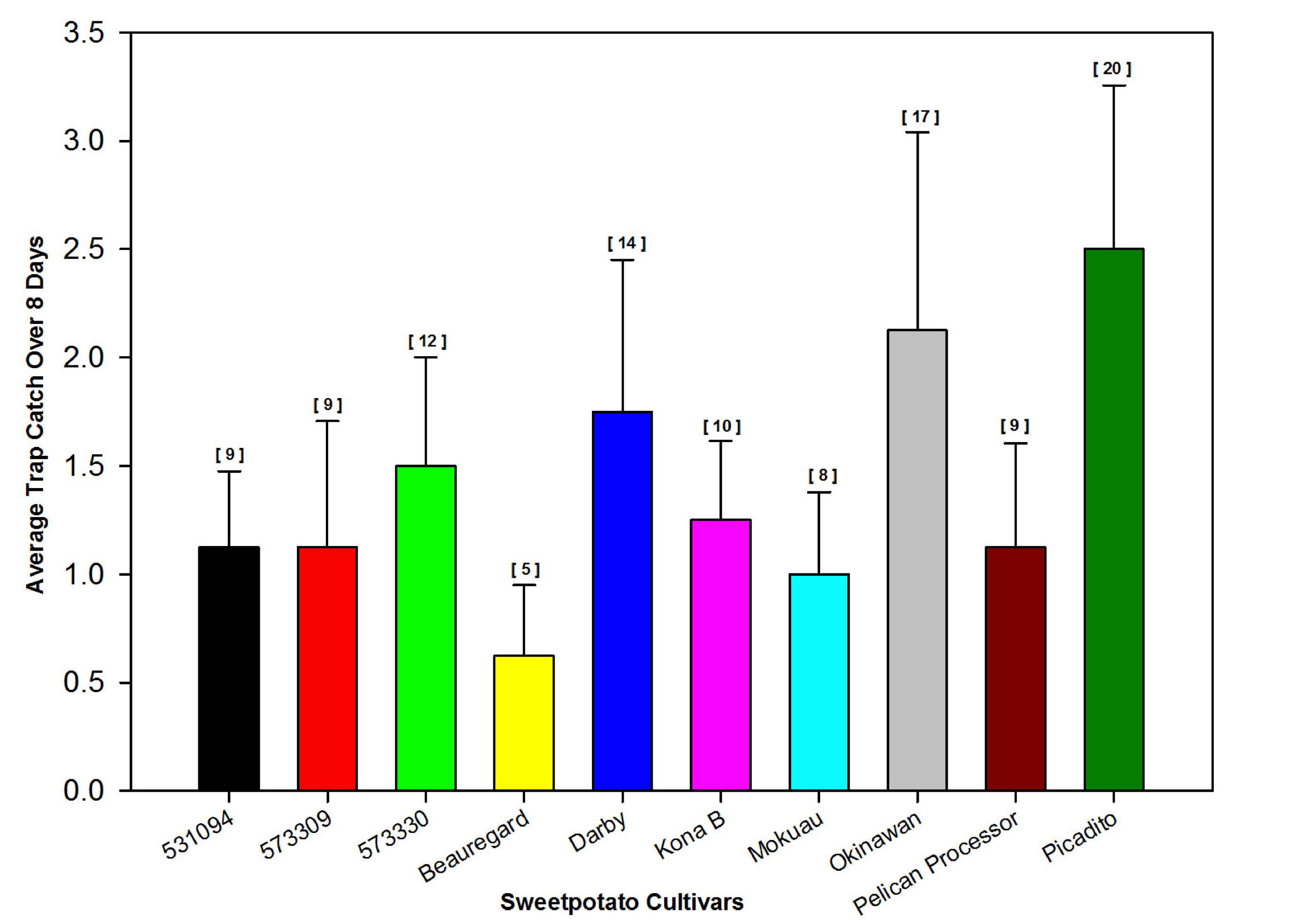

Figure 7. Average adult rough sweetpotato weevil catch by sweetpotato cultivar. One green light trap (McQuate, 2014) was randomly placed in one of four sections of each sweetpotato cultivar. Each trap was baited (inside) with a leaf inserted in a plastic container holding water and with a rectangular solid section of freshly cut sweetpotato root (averaging 2.5 x 1.2 x 1.0 cm [L x W x H] and 2.5 g) held on a wire underneath the trap's green light. The trap was serviced after 24 hours to recover any attracted weevils. After servicing, the leaf and root section in each trap were replaced with fresh leaf and root section and the traps were placed in a newly randomized position within the same cultivar row. After eight trap servicings each trap had been placed in each of the four sections of the cultivar a total of two times. Numbers at the top of each column are the total number of rough sweetpotato weevils caught in that cultivar over the course of the eight servicing dates. Because of high variability in day to day trap catch, there was no significant difference in rough sweetpotato weevil catch among cultivars.

CONCLUSIONS

Results suggest that sweetpotato cultivars differ in injury by rough sweetpotato weevil. A third planting of sweet potato cultivars will be harvested soon and data analyzed.