SCIENTIFIC NOTE

Absence of the Quarantine Pest *Elytroteinus subtruncatus* in East Hawaii Sweetpotato Fields

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Hawaii is unable to export its unique varieties of sweetpotatoes without quarantine treatment against four high-risk internal pests: West Indian sweetpotato weevil, *Euscepes postfasciatus*, sweetpotato vine borer, *Omphisa anastomosalis*, and ginger weevil (or Fijian ginger weevil), *Elytroteinus subtruncatus* are federal quarantine pests, and sweetpotato weevil, *Cylas formicarius elegantulus* is a quarantine pest for California and much of the southwestern U.S. In 2003, irradiation treatment at a dose of 400 Gy was approved to provide quarantine security for sweetpotatoes exported from Hawaii to the U.S. mainland (Federal Register 2003, 2004). Whereas sweetpotato is a known host for West Indian sweetpotato weevil, sweetpotato vine borer, and sweetpotato weevil, its host status for ginger weevil is uncertain.

E. subtruncatus was first reported in Hawaii in 1918 from common white ginger, *Hedychium coronarium* (Swezey 1919). Since its discovery, this weevil has been reported from a number of other hosts in Hawaii including avocado (*Persea americana*) seeds, day lily (*Hemerocallis* sp.), cycad (*Cycas* sp.) trunks, taro (*Colocasia esculenta*) corms, and ti (*Cordyline terminalis*) cuttings (Swezey 1952, Ford 1955), as well as dwarf mondo, (*Ophiopogon japonicus*) roots (D. Tsuda, personal observation). In Hawaii, *E. subtruncatus* is known to occur in the field only on the island of Oahu (Nishida 2002). Elsewhere, *E. subtruncatus* has been recorded from lemons (*Citrus limon*) in the Cook Islands, kava (*Piper methysticum*) stems in Tonga, dead sugarcane (*Saccharum officinarum*) in Samoa, and *Marattia douglasii* fern trunks in Tahiti (Swezey 1952, Fakalata 1981). Sweetpotato is not reported in the literature as a host.

In 1995 and 1997, *E. subtruncatus* was intercepted in passenger baggage at Keahole International Airport (Kailua-Kona, HI) on sweetpotato (PIN 2001); five interceptions were made of nine roots with a total of eight larvae and two pupae. No information was taken during the interception on commingled commodities, storage history of the sweetpotatoes, or where the roots may have originated. These interceptions led to the inclusion of *E. subtruncatus* as a high-risk pest requiring mitigation in the APHIS pest risk assessment prepared for Hawaii sweetpotatoes (USDA-APHIS-PPQ 2002) prior to export approval. *E. subtruncatus* has never been observed on sweetpotato in the field.

Research showed that the sweetpotato weevil, West Indian sweetpotato weevil and sweetpotato vine borer can be controlled at 150 Gy (Follett 2006), and this lower treatment dose was approved through an amendment published in the Federal Register on January 27, 2006 (Federal Register 2006). The amendment offered two options for controlling the regulated sweetpotato pests: The original treatment of 400 Gy, or a 150 Gy treatment supplemented by sampling, cutting, and inspection for *E. subtruncatus*. Sampling, cutting and inspecting sweetpotato roots for *E. subtruncatus* is difficult and could be extremely time-consuming depending on the sample size applied to each commercial lot.

CW Hawaii Pride LLC (Keaau, HI), the commercial irradiation facility where all sweetpotatoes for export are currently treated, has been treating sweetpotatoes at 400 Gy since the original export approval, and wanted to begin using the 150 Gy dose combined with inspection for *E. subtruncatus*. In developing the irradiation treatment for the three sweetpotato pests in Hawaii since 2003, ARS never observed *E. subtruncatus* attacking or emerging from sweetpotatoes. USDA-ARS and APHIS-PPQ jointly agreed to conduct field infestation studies and surveys of commercial shipments to provide APHIS data on *E. subtruncatus* infestation and aid development of appropriate sweetpotato sampling, cutting and inspection protocols for the irradiation facility. Sweetpotato is grown year round, and presently more than 300 acres of sweetpotatoes are grown for export in east Hawaii. No sweetpotatoes are grown commercially for export in west Hawaii or on other islands at the present time. Hawaii Pride is irradiating approximately 5 million pounds of sweetpotatoes annually, and irradiation is the only quarantine treatment method used to export sweetpotatoes.

Hawaii Pride survey. A survey to determine the presence of *E. subtruncatus* in commercial sweetpotatoes was initiated at Hawaii Pride and carried out during eight separate weeks from Feb-Apr 2007. Three boxes of sweetpotatoes were randomly selected by APHIS inspectors and transferred to the USDA-ARS laboratory for observation.

The sweetpotatoes had been sorted and graded for commercial sale before arriving at Hawaii Pride. The boxes were sealed with additional tape, as needed, to ensure no insects could enter or escape, and held at 70-75°F for two months for emergence of adult insects. After the two-month holding period, the boxes were opened and all insects were identified and counted.

Shipments sampled during the 8 weeks included sweetpotatoes from eight different sweetpotato wholesalers (Alembic, Iris Shepard, Guo, Diversified Agricultural Products, Crown Pacific, Khiao, Puna Agric, and Pio). The total sample size was 1,522 individual sweetpotatoes with a total weight of 273 kg (600 lbs).

We found 276 sweetpotato weevils, 52 West Indian sweetpotato weevils, and 1 sweetpotato vine borer (Table 1). No adult *E. subtruncatus* emerged from the commercial sweetpotatoes.

Field survey. During April-May 2006 and January-March 2007, we conducted a survey in 15 sweetpotato fields on the Big Island at elevations from 200 to 975 feet to observe for *E. subtruncatus* (Fig. 1). We collected old sweetpotatoes from abandoned fields and from the edges of unrotated fields in the Paukaa, Papaikou, Pepekeeo, Honomu, and Umauma areas of the Hamakua Coast north of Hilo, and from two fields in the Puna area southeast of Hilo. Old, exposed sweetpotato roots left in the field are a predictable host for common weevils such as the sweetpotato weevil and the West Indian sweetpotato weevil. The sweetpotato fields selected for our survey represented the range of elevations and locations found in East Hawaii.

Sweetpotatoes were collected and held in large plastic containers with screen lids for two months to allow immature insects to complete development and emerge as adults. After two months, containers were opened and all insects were identified and counted using specimens of adult *E. subtruncatus* from Fiji to facilitate identification. (*E. subtruncatus* is much larger than the two common weevil species attacking sweetpotatoes in Hawaii: Sweetpotato weevil and West Indian sweetpotato weevil.) Adult weevils and various larval life stages of sweetpotato weevil and West Indian sweetpotato weevil preserved in alcohol also were used to facilitate weevil species identification during inspections.

No adult *E. subtruncatus* emerged from 67.8 kg (150 lbs) of infested sweetpotatoes collected in 2006 and 2007, whereas 4,481 sweetpotato weevils, 4,653 West Indian sweetpotato weevils, and 56 sweetpotato vine borers emerged (Table 2).

Table 1. Insects infesting commercial sweetpotatoes processed by the Hawaii Pride (Ke'eau, HI) irradiation facility, 2007.

Date	Grower	Box #	No. Tubers	Total weight (g)	SPW	WISPW	SPVB	GW
7 Feb	Alembic	1	46	12650	0	0	0	0
7 Feb	Alembic	2	45	12290	1	0	0	0
7 Feb	Alembic	3	47	12479	0	0	0	0
12 Feb	Iris	4	59	11175	31	2	0	0
13 Feb	Guo	5	32	12355	0	0	0	0
14 Feb	Alembic	6	53	12476	6	0	0	0
20 Feb	Div. Ag	7	94	12267	0	3	0	0
21 Feb	Alembic	8	100	12000	28	0	0	0
22 Feb	Crown Pac	9	58	11177	0	0	0	0
26 Feb	Iris	10	116	11867	0	34	0	0
27 Feb	Puna Ag	11	37	6279	0	3	0	0
27 Feb	Alembic	12	64	10803	2	0	0	0
1 Mar	Khiao	13	2	195	0	0	0	0
5 Mar	Iris	14	66	12269	14	3	0	0
6 Mar	Div. Ag	15	47	12441	0	0	0	0
7 Mar	Alembic	16	6	11619	0	0	1	0
20 Mar	Alembic	17	43	12363	2	0	0	0
20 Mar	Alembic	18	31	13330	2	0	0	0
20 Mar	Crown Pac	19	73	5176	105	6	0	0
26 Mar	Alembi	20	34	12971	7	0	0	0
26 Mar	Iris	21	93	12843	0	0	0	0
27 Mar	Puna Ag	22	57	4788	0	0	0	0
2 Apr	Iris	23	116	12888	19	1	0	0
2 Apr	Pio	24	24	12516	0	0	0	0
2 Apr	Alembic	25	123	12583	59	0	0	0
Totals			**1522**	**273798**	**276**	**52**	**1**	**0**

SPW = sweetpotato weevil, WISPW = West Indian sweetpotato weevil, SPVB = sweetpotato vine borer, GW = ginger weevil (*E. subtruncatus*).

Discussion

E. subtruncatus was included on the host list in the sweetpotato pest risk assessment because it had been intercepted on contraband sweetpotato at Keahole International airport in 1995 and 1997. These records are the only known records associating ginger weevil with sweetpotato. Ginger weevil has never been reported to infest sweetpotato under natural field conditions in Hawaii or the Indo-Pacific area, its native area of distribution. Our field samples of heavily damaged sweetpotatoes and samples of commercial sweetpotato shipments showed no infestation by *E. subtruncatus*.

Ginger and taro are known hosts for *E. subtruncatus* and significant quantities of both crops are exported from Hawaii to the U.S. mainland. Ginger and taro are regulated by inspection, which includes visual inspection and cutting of rhizomes and tubers, repectively. No ginger weevil has ever been observed in over 30 years of cutting and inspection

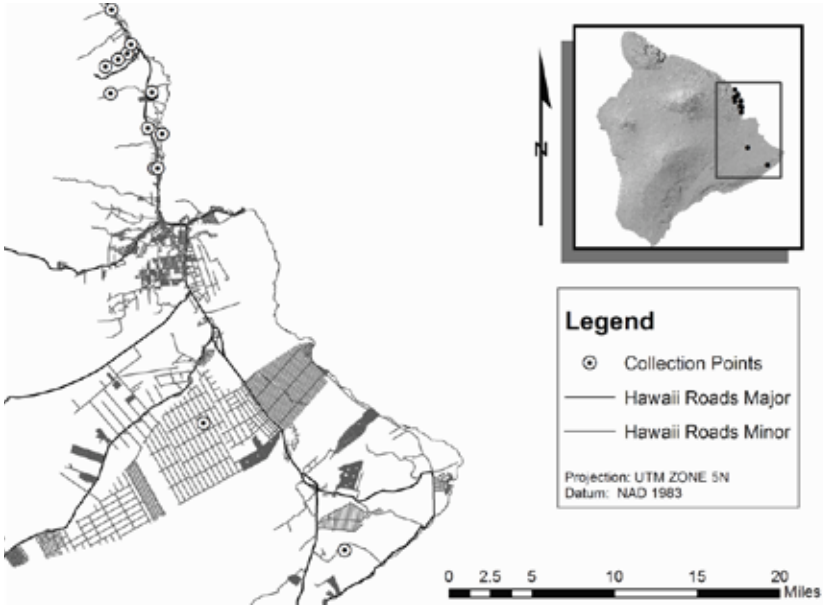

Figure 1. Collection points for sweetpotato samples from commercial fields in East Hawaii.

of ginger and taro in east Hawaii where these export crops are grown (R. Tom, personal observation).

Based on our study, and the history of APHIS regulatory inspections, it appears that commercial sweetpotato is not a pathway for *E. subtruncatus*. This result suggests that either (1) ginger weevil is absent from areas of sweetpotato production (i.e., pest-free area), or (2) sweetpotato is not a natural host for ginger weevil, or both. Therefore, sweetpotatoes could be irradiated at 150 Gy for control of sweetpotato weevil, West Indian sweetpotato weevil, and sweetpotato vine borer with minimal or no cutting and inspection for the *E. subtruncatus* before export. Curculionid weevils are generally sterilized at irradiation doses ≤150 Gy (Follett 2002, Hallman 2003, Follett 2006a, b). Therefore, the approved irradiation treatments (400 or 150 Gy) should provide control against *E. subtruncatus* if it ever appears in sweetpotato.

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Table 2. Insects infesting exposed, damaged sweetpotato roots collected from abandoned fields and field edges in East Hawaii, 2006–07.

Date	Field	GPS point Long	GPS point Lat	Elevation (ft)	Total weight (g)	SPW	WISPW	SPVB	GW
2006									
17 Apr	Liu lower	W155°5.7'	N19°50.2'	390	4641	267	323	3	0
24 Apr	Liu upper	W155°5.9'	N19°50.3'	487	5836	308	181	3	0
10 May	Honomu lower	W155°7.3'	N19°52.3'	435	7181	314	450	7	0
17 May	Honomu middle	W155°7.8'	N19°52.0'	590	7480	456	367	23	0
17 May	Honomu upper	W155°8.5'	N19°51.6'	940	6714	293	88	6	0
19 May	Onomea	W155°5.3'	N19°48.1'	175	8623	126	43	4	0
24 May	Minh upper	W155°8.2'	N19°50.2'	1130	3861	56	286	2	0
30 May	Paukaa mauka	W155°5.7'	N19°46.3'	308	3760	121	18	1	0
2007									
12 Jan	Pepeekeo	W155°5.9'	N19°50.3'	487	3945	787	248	0	0
10 Jan	Haw. Acres	W155°2.8'	N19°32.9'	915	1430	0	5	5	0
17 Jan	Kalaoa Camp	W155°6.1'	N19°48.4'	485	3262	911	1125	2	0
17 Jan	Honomu TS	W155°7.1'	N19°52.8'	260	2973	133	222	0	0
19 Jan	Kaiwiki	W155°7.4'	N19°44.8'	975	3330	152	504	0	0
5 Feb	Opihikao	W155°4.9'	N19°26.3'	350	510	0	0	0	0
6 Mar	Umauma	W155°8.2'	N19°54.6'	280	4225	557	793	0	0
Totals	**67771**	**4481**	**4653**	**56 0**					

SPW = sweetpotato weevil, WISPW = West Indian sweetpotato weevil, SPVB = sweetpotato vine borer, GW = ginger weevil

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