Distribution and Host Utilization of *Bactrocera latifrons* (Diptera: Tephritidae) on the Island of Kauai, Hawaii

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Abstract. A survey was made on the island of Kauai using hydrolyzed protein traps, fruit traps and monthly fruit collections to determine the distribution, abundance, and host preferences of *Bactrocera latifrons* Hendel. No *B. latifrons* were found in protein bait traps that caught *B. dorsalis* Hendel, *B. cucurbitae* Coquillet, and *Ceratitis capitata* (Wiedemann). Fruit traps baited with eggplant, *Solanum melongena* L., and zucchini squash, *Cucumis melo L.*, were used for the first time to detect *B. latifrons*. *B. latifrons* was found for the first time on Kauai infesting tomato, *Lycopersicum esculentum* Miller. In addition to tomato, the fly was found infesting home garden eggplant and pepper, *S. nigrum* L. *B. latifrons* was found jointly infesting fruit collections of eggplant, and tomato with *B. dorsalis* and *B. cucurbitae*, and pepper with *B. dorsalis*. Also, for the first time in Kauai, *B. dorsalis* and *B. cucurbitae* were recovered from lei kikania, *S. aculeatissimum* Jacq. Distribution of the fly was confined primarily to the arid west side of Kauai in low numbers in the towns of Kekaha, Waimea, and Hanapepe. Fruit collections were the most sensitive and reliable indicators of *B. latifrons* occurrence and host utilization. Niche biology and ecology of *B. latifrons* is discussed in relation to distribution, habitat and host sharing between species of tephritid fruit flies.

Key Words: solanaceous fruit fly, distribution ecology, host utilization, niche sharing

The frugivorous tephritid fruit flies in Hawaii consist of: the melon fly, *Bactrocera cucurbitae* Coquillet discovered in 1895 (Clark 1898); the Mediterranean fruit fly, *Ceratitis capitata* (Wiedemann) discovered in 1910 (Back and Pemberton 1918); the oriental fruit fly, *B. dorsalis* Hendel discovered in 1945 (van Zwaluwenberg 1947); and the solanaceous fruit fly, *B. latifrons* Hendel discovered in 1983 (Vargas and Nishida 1985b). The presence of fruit flies create an ongoing problem for the residents of Hawaii controlling these pests in back yard gardens to minimize destruction of fresh fruits and vegetables grown for local consumption. Fruit flies deter the economic potential in Hawaii for the development of an industry growing and exporting tropical fruits and vegetables.

The problem caused by the presence of fruit flies in Hawaii is becoming worse. On the island of Kauai, for example, some of the sugar lands have been converted to growing coffee, *Coffea arabica* L. This change in the crop environment on Kauai has created very favorable conditions for *C. capitata* (Vargas et al. 1994).

In 1983, Vargas and Nishida (1985b) reported the presence of *B. latifrons* in Hawaii for the first time. The fly was found only in Honolulu County on the island of Oahu. Seven years later, an intensive population census by Liquido et al. (1994) showed that *B. latifrons* was widely distributed on the islands of Hawaii and Maui, infesting 11 solanaceous and 4 cucurbitaceous host plants. The fly was found on the leeward side of the islands of Hawaii and Molokai, and on both leeward and windward sides of Maui.

Our objective was to determine if *B. latifrons* was established on Kauai, its seasonal abundance patterns, and the identity of the host plants infested by this fruit fly. We antici-

pated that this study would provide information on the habitat ecology of *B. latifrons* unique to the island of Kauai.

Materials and Methods

Survey areas. During detection studies on the island of Oahu (Harris et al. unpublished data), residential areas with cultivated hosts and pasturelands with feral hosts were found to be the most favorable areas for *B. latifrons*. Therefore, our studies were conducted in two main habitats on Kauai (Fig. 1): residential sites in cities and towns and in pasturelands. The residential sites included Polihale/Mana, Kekaha, Waimea, Kaumakani, Hanapepe, Wailua, and Kapaa. The pasturelands included Kilauea, Lawai, Moloaa and Omao. A total of ten traps were used in residential sites and ten traps were used in pasture sites. Few host plants of *B. latifrons* were found with ripe fruit north of Kapaa. The towns listed had host plants with ripe and unripe fruits throughout most of the 2-year study period providing the fruit collected in our survey.

Fruit and **vegetable collecting.** Efforts were made every month to collect fruit samples. Fruit samples were found to be available seasonally in residential and pasture areas. The fruit samples collected were handled as a group to increase survival of fruit fly species in each sample Harris and Lee (1992). The fruit samples were brought into the laboratory, counted, weighed, and placed in screened holding boxes (Cunningham et al. 1980) containing sand to rear out flies and parasitoids from the samples. The sand in the holding boxes was screened weekly to remove mature pupae. The pupae collected were held in glass jars at ambient temperatures of 24.8–26°C and relative humidity of 60–70% until emergence was completed and the numbers of flies and parasitoids recorded.

Hydrolyzed protein trap sampling. Beginning in April 1991 until May 1993, twenty plastic traps of the bucket design used by Hafraoui et al. (1980) were filled with 50 ml of liquid bait consisting of a Mixture of 72 ml Nulure® (a protein hydrolysate) and 50 grams borax in one liter of water. We chose Nulure® hydrolyzed protein bait as the attractant for the traps to focus on tephritid fruit fly female seasonal behavior, since protein hydrolysate is an attractant for most tephritid fruit fly females, and no female lure equivalent to male lure is available. Trap distribution was made in twenty of the trap sites shown in Fig. 1. These traps were targeted to catch sexually mature *B. latifrons* females. Since the lure is not specific for *B. latifrons* only, *B. dorsalis*, *B. cucurbitae*, and *C. capitata* females were caught also. Traps were serviced monthly to collect, count, and record fly catches, replenish the lure and replace missing traps.

Fruit trap sampling. The residents of Kaumakani Plantation Camp regularly grew vegetables for local consumption. These fruits were harvested at maturity and seldom allowed to become overripe. Therefore we distributed fruit traps in Kaumakani to lure gravid *B. latifrons* females to oviposit in fruit traps. Harris and Bautista (1994) reported that the fruit trap is an effective tool for catching fruit flies and their parasitoids. Mature purple eggplant *Solanum melongena* L. and zucchini squash, *Cucumis melo* L. were purchased in a local market in Honolulu and used as fruit traps on Kauai. Groups of 20 fruits, with individual fruits enclosed in garden netting (mesh 1.5 x 1.5 cm) and taped at one end, were suspended in each of 20 gardens in Kaumakani, Kauai. The fruits were punctured with wire creating 8-10 evenly distributed holes to facilitate oviposition by fruit flies. The traps were left exposed in the field for 4–5 days, then recovered, and taken to the laboratory in Honolulu and placed in fruit holding boxes and handled as previously described to recover fruit flies and parasitoids.

Data analysis. Trap catches collected in residential and pasture sites were removed from traps and counted monthly. Trap catches were expressed as means (± SEM) converted to the

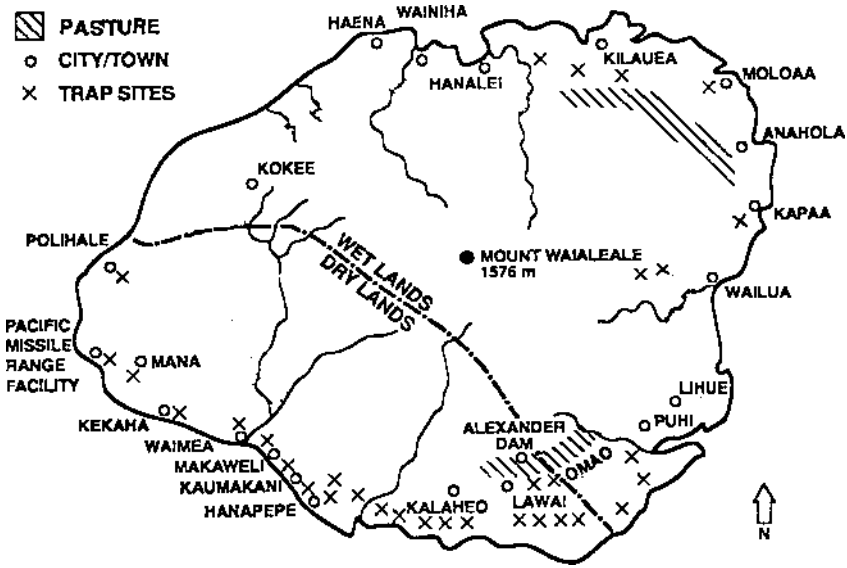

Figure 1. Map of Kauai showing the locations and distribution of B. latifrons trap sites and fruit collection sites.

number of flies caught per trap per day. The means were subjected to square root (x+1) transformation (Snedecor and Cochran 1967). Variation among trap sites, months, and residential and pasture areas was assessed by analysis of variance procedure (SAS Institute 1985). A 0.05 probability was used as the significance criterion for all statistical tests.

Results

Table 1 summarizes the data obtained from infested fruit collections in residential and pastureland areas in the chronological order the fruit collections were made. Likewise, host fruiting phenology is shown by site location and fruit type infested. The highest numbers of *B. latifrons* (Fig. 2) were reared from three vegetables (eggplant, pepper, and tomato) collected from home sites in Kekaha, and Waimea. Ranking of residential study sites in Table 1 in relation to numbers of fruits collected was as follows: Kekaha > Waimea > Hanapepe. Ranking of the sites in relation to kinds of fruits collected was as follows: Kekaha = Waimea < Hanapepe.

In Kekaha, 16 of the 32 infested fruit samples collected were infested with *B. latifrons.* Fourteen of the 18 eggplant samples were infested with *B. latifrons*. Two of the 14 eggplant samples were shared by *B. dorsalis* and *B. latifrons*. Two eggplant samples were infested only with *B. cucurbitae.* One bell pepper and one tomato sample was infested only *with B. latifrons*. The 5 bittermelon samples were infested only with *B. cucurbitae*. The 8 cherry tomato samples were infested, one with *B. latifrons* and the others with *B. cucurbitae*, *B. dorsalis* or both. Thus, utilization of eggplant and other fruits by *B. latifrons* continued from June 1991 to

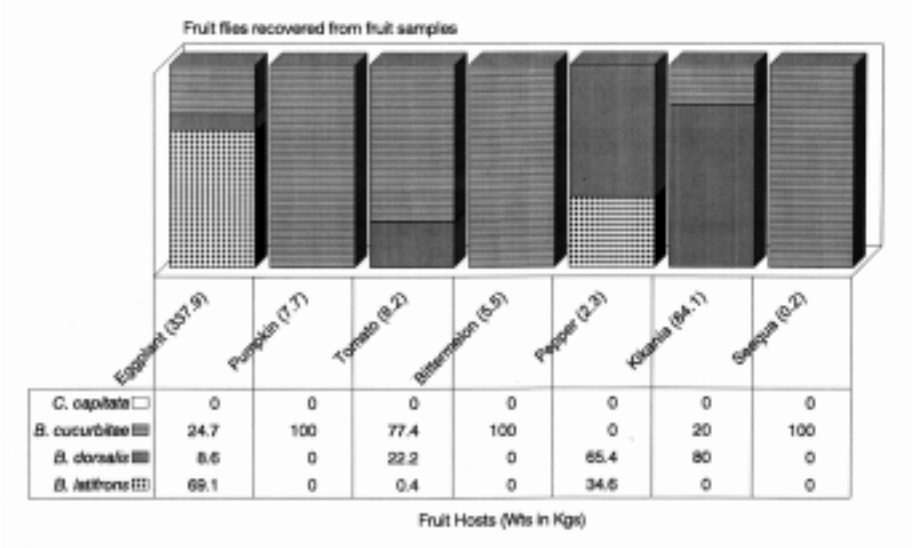

Figure 2. Capture of *Bactrocera dorsalis*, *B. Cucurbitae, Ceratitis capitata,* and *B. latifrons* on Kauai in protein hydrolysate–baited traps (April 1991–May 1993).

November 1992. Although infested eggplant was collected in 7 sites in Kekaha, 53% of the total *B. latifrons* recovered from fruit collected in Kekaha came from one home site.

In Waimea, 10 of 20 infested fruit samples were infested with *B. latifrons*. Ten of the 18 eggplant samples were infested with *B. latifrons*. Five of the 18 eggplant samples were infested with *B. dorsalis* only. Three of the 18 eggplant samples were shared by *B. latifrons* and *B. dorsalis*. The one pumpkin sample was infested with *B. cucurbitae*. Infested eggplant was collected at 3 sites in Waimea. Eighty three percent of the total *B. latifrons* recovered from fruit in Waimea came from one home site. From October–November 1991 and January to August 1999, Only 3 kinds of fruits were available in Waimea.

In Hanapepe, 1 of 8 infested fruit samples was infested with *B.* latifrons. Of the 3 eggplant samples collected, one was infested with *B. latifrons*, one was infested with *B. dorsalis* and the other with *B. dorsalis* and *B. cucurbitae*. The three tomato samples were infested with *B. dorsalis* alone or with *B. dorsalis* and *B. cucurbitae*. From December 1991 to January, May July and August 1992, few fruits were available for utilization by the fruit flies.

In Kaumakani, 3 of the 6 fruit samples collected in the plantation camp were infested with *B. cucurbitae*. The 3 eggplant samples collected (total 108 fruits) were not infested. The one seequa (*Luffa acutangula* (L.) Roxb., cherry tomato, and bittermelon sample was infested with *B. cucurbitae* only. The bittermelon samples were infested with *B. cucurbitae* only.

In pasture areas (Table 1), two lei kikania fruit samples (140 fruits) were infested from 10,897 fruits collected. Lei kikania was only a minor feral host for *B. dorsalis* and *B. cucurbitae* (Hawaii Entmol. Soc. Newsletter 1991). Although ripe lei kikania fruits were available for 18 months in pasture areas during our studies, the tephritid fruit fly species on Kauai utilized lei kikania very little. During our studies, the few ripe fruits available in Polihale, Moloaa, Lawai and Omao were infested by *B. cucurbitae* and *B. dorsalis*.

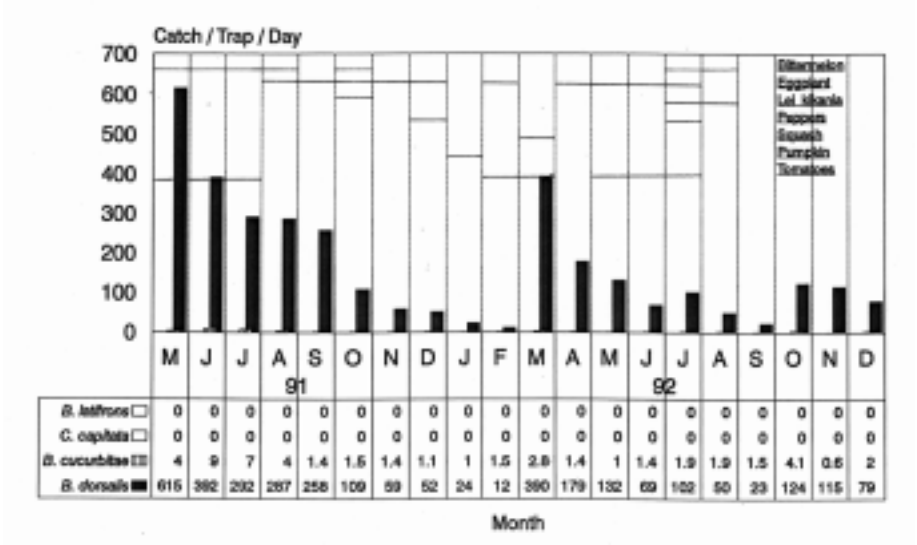

Figure 3. Percentages of *Bactrocera dorsalis, B. Cucurbitae, Ceratitis capitata*, and *B. latifrons* fruit flies recovered from fruit samples collected on Kauai (April 1991–May 1993).

Of the parasitoid species recorded in Table 1, most were *Fopius arisanus* (Sonan) and a few were *Dichasimorpha longicaudata* (Ashmead), *Psyttalia fletcheri* and *P. incisi* (Sylvestri). No attempt was made to identify the fruit fly hosts from which the parasitoids emerged.

Discussion

We conducted studies to find out if *B. latifrons* was present on the island of Kauai. The focus of our efforts was on the use of hydrolyzed protein bait trapping to catch adult flies and fruit collecting to identify infested host fruits. The trap data (Fig. 3) showed that no *B. latifrons* were caught in the traps. Apparently, protein hydrolysate may not be the best hydrolyzed protein to attract *B. latifrons* even though traps were located in gardens which contained fruit infested by *B. latifrons*. The traps in the residential areas caught a few *C. capitata*. There were no significant differences in mean trap catches for *B. dorsalis* by month or between residential and pasture sites. *B. cucurbitae* trap catches were different, the mean catch of residential area traps was significantly higher ($F=3.97$; $df= 1,374$; $P > 0.05$) than the mean catch of traps in pasture areas. Hurricane Iniki caused a 2-month disruption in the operation of traps during September and October 1992. Thereafter, fruit fly populations recovered quickly and trap catch patterns returned to pre-storm levels.

Our fruit collection data showed that fruits infested with *B. latifrons* were found primarily in Kekaha and Waimea where some of the homeowners left ripe fruits in gardens after maturity. This practice created favorable conditions for reproduction of fruit flies. In these locations, green and purple eggplant turned yellow when overripe creating favorable conditions utilized more by *B. latifrons* more than by other fruit flies. The fruiting pattern in Kakaha was characterized by extended fruiting of bittermelon, cherry tomato, and eggplant

in a few sites resulting in host sharing by *B. latifrons, B.cucurbitae* and *B. dorsalis*.

In Kaumakani, after Hurricane Iniki in September 1992, on the sixth use of the fruit trap, *B. latifrons* was detected in an eggplant trap (Table 2). Eleven *B. latifrons* were reared from eggplant along with two *B. dorsalis* in the same sample. This was the first evidence of the presence of *B. latifrons* in Kaumakani. The extremely low numbers of *B. latifrons* present apparently was due to the low number of fruits in the condition preferred for oviposition by *B. latifrons*. The primary difference between the Kaumakani site compared with Kekaha and Waimea was the absence of mature and overripe eggplant in the gardens for several consecutive months. Follow up studies have been made using eggplant fruit traps, but no more *B. latifrons* have been caught in Kaumakani.

Our data showed that fruit fly distribution, abundance, and host fruit utilization was strongly influenced by the higher host diversity in residential areas. The large pasture areas with Lei kikania was relatively unattractive to the tephritid fruit flies compared with the residential areas with a diversity of host fruits. The evidence that over 50 percent of *B. latifrons* recovered from fruit samples came from one location in Kekaha and one location in Waimea was a surprise. On Kauai, homeowners creating and destroying econiches had a stronger effect on *B. latifrons* abundance and distribution than on the other fruit fly species in the residential areas on Kauai. If we had been overly zealous in sampling fruits in Kekaha or Waimea and removed all the fruits at the 2 sites where *B. latifrons* persisted we would have destroyed the niche for *B. latifrons* before we finished our studies. The best site for *B. latifrons* in Kekaha was destroyed by Hurricane Iniki, and the homeowner did not replant eggplant. Likewise, the homeowner in Waimea removed eggplant from her garden in December 1992 and did not replant.

We conclude from our studies that *B. latifrons* prefers residential garden habitats with solanaceous vegetables, especially eggplant. When mature eggplant fruits are left in the field and allowed to become overripe, this creates a favorable niche for *B. latifrons* that gives this species a competitive advantage over other fruit flies utilizing eggplant on Kauai.

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Table 1. Summary of infested fruits by type, number of fruit in sample, fruit sample weight, number of dead pupae, number of parasitoids, number of fruit flies emerged on Kauai (1991–1993).

Month	Year	Site	Location	Fruit Type	Fruit No.	Pupae No.	Dead Pupae	Parasitoid No.	C. capitata	B. cucurbita	B. dorsalis	B. latifrons
Residential Areas												
Mar	91	Kekaha	Trap 16	Bittermelon	7	88	2	2	0	85	0	0
Apr	91	Kekaha	Trap 16	Cherry tomato	9	1	0	0	0	1	0	0
May	91	Kekaha	Trap 15	Cherry tomato	33	72	14	4	0	51	3	0
Jun	91	Kekaha	Trap 16	Cherry tomato	30	2	1	0	0	0	0	1
	91	Kekaha	“Trap 17,18”	Bittermelon	3	41	17	0	0	24	0	0
Jul	91	Kekaha	Trap 16	Bittermelon	8	15	8	0	0	7	0	0
	91	Kekaha	Trap 16	Cherry tomato	16	14	3	0	0	11	0	0
	91	Kekaha	Kaneshiro Res.	Yellow eggplant (long)	15	52	22	0	0	0	3	27
Aug	91	Kekaha	Kaneshiro Res.	Purple eggplant (long)	33	32	3	0	0	0	0	29
	91	Kekaha	Trap 16	Bittermelon	28	57	25	0	0	32	0	0
Sep	91	Kekaha	“Trap 17,18”	Green eggplant (long)	30	22	1	0	0	21	0	0
	91	Kekaha	Kaneshiro Res.	Purple eggplant (long)	32	1	0	0	0	0	0	1
Oct	91	Kekaha	Trap 15	Bittermelon	8	6	4	0	0	2	0	0
	91	Kekaha	Kekaha/Pueo Rd	Purple eggplant (long)	4	11	0	0	0	0	0	11
Nov	91	Kekaha	Res. Kaneshiro	Yellow eggplant (long)	15	10	1	0	0	0	0	9
Dec	91	Kekaha	Res. Kaneshiro	Purple eggplant (long)	39	38	3	0	0	0	0	35
Feb	92	Kekaha	Trap 15	Cherry tomato	42	42	6	0	0	36	0	0
	92	Kekaha	Res.-Kaneshiro	Purple eggplant (long)	7	1	1	0	0	0	0	0
	92	Kekaha	“Trap 17,18”	Purple eggplant (long)	11	26	6	7	0	0	0	13
Mar	92	Kekaha	Trap 15	Cherry tomato	32	56	13	0	0	42	0	0
Apr	92	Kekaha	Res.-Kaneshiro	Purple eggplant	14	8	4	0	0	0	0	4
	92	Kekaha	Res.-Kanekuni	Purple eggplant	15	44	4	1	0	0	0	39
May	92	Kekaha	Res.-Kanekuni	Purple Eggplant	48	128	0	0	0	128	0	0

	92 Kekaha	Res.	Cherry tomatoes	24	60	5	5	0	55	0	0
Jun	92 Kekaha	Res.-Kanekuni	Purple eggplant	24	21	15	1	0	1	4	0
Jul	92 Kekaha	Res.-9589 Kiowea	Green bell pepper	15	19	10	0	0	0	0	9
	92 Kekaha	Res.-Kaneshiro	Long brown eggplant	13	30	10	0	0	0	0	20
	92 Kekaba	Res.-Kaneshiro	Cherry tomatoes	28	0	0	0	0	0	0	0
	92 Kekaha	Res.-Kanekuni	Long yellow eggplant	41	15	3	0	0	0	0	12
	92 Kekaha	7924 Kekaha	Long yellow eggplant	47	17	9	0	0	0	2	6
	92 Kekaha	4607 Palila Loop	Long purple eggplant	9	5	0	0	0	0	0	5
Nov	92 Kekaha	Res.-Kaneshiro	Long yellow eggplant	19	105	21	0	0	0	0	84
	Sum	699	1039	211	20	0	497	12	305		
			Mean	21.84	32.47	6.59	0.63	0	15.53	0.38	9.53
			STDERR	2.33	5.62	1.26	0.29	0	5.21	0.18	3.10
			N	32	32	32	32	32	32	32	32
Oct	91 Waimea	Res.	Yellow eggplant (long)	12	23	22	0	0	0	1	0
Nov	91 Waimea	Mill Camp #18	Eggplant	3	10	4	0	0	0	6	0
Jan	92 Waimea	9628 Gay Rd	Yellow eggplant (long)	12	20	4	0	0	0	0	16
	92 Waimea	3359 Gay Rd	Pumpkin	1	22	8	0	0	14	0	0
	92 Waimea	9828 Gay Rd	Yellow eggplant (long)	15	10	3	0	0	0	0	7
May	92 Waimea	9629 Haina Rd	Purple eggplant	36	1	0	0	0	0	1	0
	92 Waimea	9828 Gay Rd	Purple eggplant	35	3	3	0	0	0	0	0
	92 Waimea	Res.(9828 Gay Rd)	Yellow eggplant	4	2	2	0	0	0	0	0
Jun	92 Waimea	Res.(9828 Gay Rd)	Yellow eggplant	82	2	1	0	0	0	0	1
	92 Waimea	9828 Gay Rd	Yellow eggplant	25	15	3	0	0	0	10	3
	92 Waimea	9620 Haina Rd	Purple eggplant	25	35	31	0	0	0	4	0
Jul	92 Waimea	4641 Gay Rd	Red bell pepper	2	9	8	0	0	0	1	0
	92 Waimea	4641 Gay Rd	Long purple eggplant	19	10	1	0	0	0	0	9
	92 Waimea	Res.	Long purple eggplant	21	12	3	2	0	0	0	7
	92 Waimea	Res.-9628 Gay Rd	Long yellow eggplant	20	52	40	0	0	0	6	6
	92 Waimea	9683 Mauli	Long yellow eggplant	15	9	1	0	0	0	0	8

Table 1 (continued)

Month	Year	Site	Location	Fruit Type	Fruit No.	Pupae No.	Dead Pupae	Parasitoid No.	C. capitata	B. cucurbita	B. dorsalis	B. latifrons
	92	Waimea	9620 Haina Rd	Short brown eggplant	80	1	1	1	0	0	0	0
	92	Waimea	Res.-9828 Gay Rd	Long yellow eggplant	19	1	1	0	0	0	0	0
	92	Waimea	8589 Kiwea	Long yellow eggplant	15	18	2	0	0	0	0	14
Aug	92	Waimea	9828 Gay Rd	Long yellow eggplant	45	96	30	0	0	0	16	50
	Sum		486	351	168	3	0	14	45	121		
				Mean	24.3	17.55	8.4	0.16	0	0.74	2.37	6.37
				STDERR	5.04	5.02	2.69	0.12	0	0.74	1	2.69
				N	20	20	20	20	20	20	20	20
Dec	91	Hanapepe	Res. Sakahashi	Red bell pepper	23	42	9	17	0	0	16	0
	91	Hanapepe	3541 Eleu Rd	Purple eggplant (long)	25	2	1	0	0	0	1	4
Jan	92	Hanapepe	Moi and Eleu Rd	Yellow eggplant (long)	20	4	0	0	0	0	0	0
May	92	Hanapepe	Res.-Sakahashi	Salad tomato	78	63	17	0	0	0	46	0
	92	Hanapepe	Res.-Sakahashi	Purple eggplant	84	16	0	0	0	14	2	0
Jul	92	Hanapepe	Res.-Sakahashi	Chinese bittermelon	51	28	10	0	0	18	0	0
	92	Hanapepe	Res.-Sakahashi	Cherry tomatoes	73	52	39	0	0	5	8	0
Aug	92	Hanapepe	Stanley Sakashi	bitttermelon	62	128	37	0	0	91	0	0
	Sum		416	335	113	17	0	128	73	4		
				Mean	52	41.88	14.13	2.13	0	16.00	9.13	0.5
				STDERR	9.29	14.55	5.61	2.13	0	11	5.63	0.5
				N	8	8	8	8	8	8	8	8
Jul	92	Kaumakani	Res.-Filipino Camp	Short brown eggplant	42	0	0	0	0	0	0	0
Aug	92	Kaumakani	Res.-Plantn. Camp	Long yellow eggplant	33	0	0	0	0	0	0	0
	92	Kaumakani	Res.-Plantn. Camp	Long yellow eggplant	33	0	0	0	0	0	0	0

Mar	93 Kaumakani	Seequa	4	41	11	0	0	30	0	0	
	93 Kaumakani	Cherry tomato	50	3	2	0	0	1	0	0	
	93 Kaumakani	Bittermelon	30	32	8	0	0	24	0	0	
			Total	192	76	21	0	0	55	0	0
			Mean	32	12.67	3.5	0	0	9.17	0	0
			STDERR	6.36	7.64	1.96	0	0	5.69	0	0
			N	6	6	6	6	6	6	6	6
Pasture Areas											
Oct	91 Kiiauea	Lucas Estate	Kikania (orange)	73	2	0	0	0	0	2	0
Oct	91 Kalaheo	Plantn. Camp	Bittermelon	28	52	5	0	0	47	0	0
	91 Kalaheo	Plantn. Camp	Bittermelon	28	52	5	0	0	47	0	0
			Total	56	104	10	0	0	94	0	0
			Mean	28	52	5	0	0	47	0	0
			STDERR	0	0	0	0	0	0	0	0
			N	2	2	2	2	2	2	2	2
Mar	92 Polihale	Rdway-Park	Bittermelon	8	4	0	0	0	4	0	0
Jul	92 Moloaa	Pastureland	Orange Kikania	191	6	1	0	0	1	4	0
Aug	92 Lawai	Pastureland	Orange Kikania	201	0	0	0	0	0	0	0
Aug	92 Omao	4149 Omao Rd	Orange Kikania	73	0	0	0	0	0	0	0
Mar	92 Polihale	Rdway-Park	Bittermelon	8	4	0	0	0	4	0	0

Table 2. Summary of tephritid fruit flies and parasitoids reared from eggplant and zucchini squash used as detection traps in Kaumakani, Kauai (1991–1993).

Date Exposed	Kind of Fruits	No. Hung	No. Pupae	Fruit Flies			Parasitoids	
				B. cucurbitae	*B. dorsalis*	*C. capitata*	*B. latifrons*	*P. fletcheri*	*P. incisi*
7/7–11/92	Eggplant	20	228	105	0	0	0	0	0
	Zucchini	20	3397	3000	0	0	0	44	0
8/25–29/92	Eggplant	20	9	8	0	0	0	0	0
	Zucchini	20	1283	986	0	0	0	0	0
2/2–6/93	Eggplant	20	3	0	0	0	0	0	0
3/25–30/93	Eggplant	20	0	0	0	0	0	0	0
	Zucchini	20	622	614	0	0	0	0	0
4/16–20/93	Eggplant	20	11	10	0	0	0	0	0
	Zucchini	20	1193	1010	0	0	0	0	0
5/27–61/93	Eggplant	20	92	45	2	0	11	0	0
	Zucchini	20	775	455	1	0	0	14	0
6/24–29/93	Eggplant	20	96	87	0	0	0	0	0
	Zucchini	20	1402	1201	1	0	0	0	7
7/22–27/93	Eggplant	20	29	0	0	0	0	0	0
	Zucchini	20	1442	1401	0	0	0	0	14
Total	Eggplant	160	468	255	2	0	11	0	
	Zucchini	140	10114	8667	2	0	0	65	14
Mean	Eggplant	20	58.5	32.58	0.25	0	1.38	0	0
	Zucchini	20	505.7	433.35	0.1	0	0.03	0	0
Stderr	Eggplant	0	27.82	15.03					
	Zucchini	0	346	266.3					