Short Communication

Larval Development of *Bactrocera dorsalis* (HENDEL) and *B. cucurbitae* (COQUILLETT) (Diptera : Tephritidae) on Okra

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Abstract : Okra, *Abelmoschus esculentus,* was exposed to two laboratory - reared tephritids, *Bactrocera dorsalis* and *Bactrocera cucurbitae,* in cages. Adults of *B. dorsalis* emerged from both punctured and intact fruits. In *B. cucurbitae,* adults emerged from punctured fruit, while no adult emerged from intact fruit. In inoculation test, 25.3% and 11.3% of viable eggs reached into adults in *B. dorsalis* and *B. cucurbitae,* respectively. Developmental period from egg inoculation to adult emergence is 18.5 days in *B. dorsalis* and 16.5 days in *B. cucurbitae.*
Key words : *Bactrocera dorsalis, Bactrocera cucurbitae,* okra, *Abelmoschus esculentus,* development, infestation

INTRODUCTION

Oriental fruit fly, *Bactrocera dorsalis* (HENDEL) and melon fly, *B. cucurbitae* (COQUILLETT) are of particular quarantine importance. Many kinds of fruits have been recorded as host plants of *B. dorsalis.* However, the host status seems to be different among these plants. *B. cucurbitae* is a serious pest of Cucurbitaceae. Some non - cucurbit plants are also described as host plants, but their status was not examined adequately.

Some researchers reported okra, *Abelmoschus esculentus* (L.) MOENCH, as a host of fruit flies (WHITE and ELSON - HARRIS, 1992 ; REJESUS et al., 1991). However, the host status is still unclear. In this study, the larval development of both flies on okra was examined to clarify the host status of okra.

MATERIALS AND METHODS

Flies

Fruit flies were obtained from laboratory colonies at the Yokohama Plant Protection Station under the permission of the Minister of Agriculture, Forestry and Fisheries. *Bactrocera dorsalis* was originally collected in Okinawa Island 15 years ago, while *B. cucurbitae* was collected in the Yaeyama Islands 25 years ago. Both flies have been reared artificially in our laboratory.

At present, both flies were eradicated from Japan including above - mentioned Islands (YOSHIZAWA, 1993).

Infestation test

Fruit of okra was rinsed with water and punctured with a steel pin (0.5 mm in diameter) before exposure to female flies. The number of punctures was 15 per fruit. Twelve punctured fruits (ca. 100 g) were exposed to 10 gravid females of each fly in a screen - net cage (ca. 15 × 25 × 20 cm). Intact fruits were also used. The flies were allowed to lay eggs into fruit freely. After 24 hours' exposure, fruits were

removed from the cage and held on moistened sand in a plastic container (ca. 9 × 11 × 9 cm) with a lid of screen net. The number of adults emerged was recorded daily. The test was replicated 5 times.

Inoculation test

Eggs of both flies were collected for 4 hours from the labolatry - colonies by egging receptacle for *B. dorsalis* and *B. cucurbitae* (OHTO et al., 1991). A hole (ca. 7 mm in diameter) was bored in fruit. A piece of cloth (ca. 7 × 7 mm) with 20 eggs was put into the hole. The plug for each hole was replaced to prevent from drying inside. At the same time, a part of the plug was cut off to prevent eggs from asphyxiation. After inoculation, five fruits were held on moistened sand in a plastic container (6.5 cm in diameter and 11 cm in height) with a lid of screen net. The number of adults emerged was recorded daily. The test was replicated 6 times for each fly.

Meanwhile, 50 eggs for each fly were placed on cloth (ca. 15 × 15 mm) and held on moistened filter - paper in a petri dish. After 50 hours, the number of larvae hatched was counted to verify the egg viability. The test was replicated 10 times.

Conditions for tests

All tests were conducted at 26 ± 1 ℃, 60 - 70% RH and a photoperiod of 16L : 8D. Tested fruits of okra were at the stage of maturity for sale.

RESULTS

Tables 1 and 2 show the results of infestation test and inoculation test, respectively.

Infestation test

Five point four and 19.6 adults of *B. dorsalis* emerged from intact and punctured fruit, respectively. In *B. cucurbitae,* no adult emerged from intact fruit, while 3.0 adults emerged from punctured fruit.

Inoculation test

Survival rates of adults to the number of viable eggs were 25.3% in *B. dorsalis* and 11.3% in *B. cucurbitae.* The developmental period from egg inoculation to adult emergence was 18.5 days in *B. dorsalis* and 16.5 days in *B. cucurbitae.*

Table 1. Development of *B. dorsalis* and *B. cucurbitae* on okra at 26 ℃ in infestation test

	Okra	No. replication	Mean no.adult emerged ± SD	Developmental[1] period (day) Mean	Range
B. dorsalis	Intact	5	5.4 ± 6.2	19.3	18 - 23
	Punctured	5	19.6 ± 18.7	19.5	16 - 23
B. cucurbitae	Intact	5	0.0 ± 0.0	-	-
	Punctured	5	3.0 ± 4.2	15.8	15 - 18

[1] The period from the end of fruit exposure to adult emergence.

Table 2. Development of *B. dorsalis* and *B. cucurbitae* on okra at 26 ℃ in inoculation test

	No. viable egg [1]	Adult emerged		Developmental [3] period (day)	
		Mean no.± SD	Survival(%)[2]	Mean	Range
B. dorsalis	68.0	17.2 ± 14.0	25.3	18.5	17 - 23
B. cucurbitae	91.4	10.3 ± 6.7	11.3	16.5	15 - 21

[1] The number of egg inoculated × hatchability.

[2] Percentage was expressed as the ratio of adult emerged to the number of viable egg.

[3] The period from egg inoculation to adult emergence.

DISCUSSION

IWAIZUMI et al. (1994) carried out infestation test of both flies on several kinds of fruits by using similar methods. In their test, 165 adults of *B. dorsalis* emerged in a mango fruit and 123 adults of *B. cucurbitae* in a fruit of bitter gourd. The amount of a mango fruit differed from that of okra tested so that the number of adults from okra could not be compared directly with that from mango. Nevertheless, the number of adults emerged from okra seems to be smaller than that from mango in *B. dorsalis*. The similar result was obtained from the test using *B. cucurbitae*. The number of adults even from puctured fruit seems to be much smaller than bitter gourd. No adult emerged from intact fruit in this test, but it was confirmed that a few adults emerged from intact fruit in previous test under similar conditions (unpublished data). These results might be affected by using old females (50 day - old after emergence) whose fecundity per day was decreasing (VARGAS et al., 1984).

Survival rate of each fly on okra was not so high compared with that on the major host fruits. The developmental period of each fly on okra was equivalent to that on mango (for *B. dorsalis*) or bitter gourd (for *B. cucurbitae*) (IWAIZUMI et al., 1994).

Therefore, okra is a sufficient fruit for each fly to survive during immature stages and develop to adult, even though the fruit might not be so suitable for the development in comparison with major host fruits.

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和 文 摘 要

ミカンコミバエ *Bactrocera dorsalis* (HENDEL) 及びウリミバエ *B. cucurbitae* (COQUILLETT) (双翅目、ミバエ科) のオクラでの発育について

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室内飼育のミカンコミバエ及びウリミバエを用い、オクラ生果実での両種ミバエの発育に関する調査を行った。両種ミバエを放飼したケージ内に、オクラ生果実を入れ自由に産卵させた。ミカンコミバエでは、針で傷をつけた果実と傷をつけていない果実、両方に産卵し、ふ化した幼虫は成虫まで発育した。ウリミバエでは、針で傷をつけた果実からは成虫が羽化したが、傷をつけていない果実からは成虫は得られなかった。また、オクラ生果実に人工的に卵を接種した場合、ミカンコミバエでは、ふ化幼虫の 25.3 %が、また、ウリミバエでは 11.3 %が成虫となった。卵接種から成虫羽化までの期間はミカンコミバエで 18.5 日、ウリミバエで 16.5 日であった。