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雄性不姙技術을 利用한 쇠파리 驅除에 關한 究研

(3) 쇠파리의 人工大量飼育에 關하여

鄭圭會*·柳 駿*·權臣漢*

Study on Stable Fly Eradication by Sterile-Male Technigue

(3) Mass Rearing of the Stable Fly, *Stomoxys calcitrans* L.

K.H. Chung*·J. Ryu*·S.H. Kwon*

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摘 要

쇠파리의 室內 大量飼育을 爲한 實驗에서 産卵前期間을 短縮 시킴으로써 死虫率을 低下시키며 累代飼育에 依한 倭少現象을 調査 하기 爲해 各 世代別 蛹重量의 差異를 조사 하였으며 쇠파리는 成虫期 以外에는 雌雄區別이 不可能 하므로 蛹重量에 依한 性區別을 試圖한 結果는 다음과 같다.

1) 幼虫 media 로 부터 蛹을 分離할때 使用하는 물을 約 25°C로 加溫하여 蛹을 採取한 結果 産卵前期間이 8日로 短縮되었다.

2) 累代飼育에 依한 世代別 倭少現象 調査에서 各世代別 蛹重量差異에는 有意性이 없었으며 飼育溫度에 따라서 많은 差異를 보였다.

3) 蛹重量의 差異에 依한 性區別은 約 60%의 雄虫區別이 可能 하였다.

Introduction

In order to rear stable fly, *Stomoxys calcitrans* (L.) in laboratory scale, a preliminary study on artificial diet was carried[7),8)] in previously.

For the purpose of control of stable fly by means of sterile-male techuique, a large number of steriled males induced radiation irradiation are required to release. To obtain a large number of pupae in a short period of time under laboratory conditions, an effect of temperature on the life span of fly was determined. Since it would be very desirable to irradiate only pupae which will produce male flies, an additional investigation on sexing based on size and weight of pupae was also carried out.

Materials and Methods

Adults: One thousand of adult flies were kept in each 18 mesh iron screen cage measuring 40×50×40 centimeters. The adult flies were fed with warmed blood (27°C) soaked in 0.5 cm thick sponge pads. To prevent sticking the blood sponge on cage and drying of the blood, the blood soaked sponges were placed on kleenex tissue and covered with a glass dishes.

Eggs: Eggs were collected from 9:00 to 11:00 a.m. by placing an egging tray in each adult cage. The adults

*Applied Genetics Lab., Korea Atomic Energy Research Institute.
韓國原子力研究所, 應用遺傳學研究室.

oviposite throughout the life from 7 days after emerging.[5] Fermented CSMA[6] added 5 per cent ammonium hydroxide were covered with a black cotton cloth and placed in a petri dish and then put iron screen on black cloth cover.[4,11]

Larvae: In order to give optimum temperature[1] condition in larvae aging process, the colonies were reared at 27+1°C incubator.

Pupae: Complete pupation was observed 9 days after seeding in the rearing medium. The pupae were then separated from the larval medium by washing with tap water[9]. The temperature of washing water was adjusted to about 25°C during the winter season experiment.

Sexing: One to two days old pupae were individually weighed and placed individually in glass vials sealed with cotton or screw-on caps. The vials were then placed in an incubator and kept at 25+1°C for 5 days. Each day the vials were checked for adult flies at 10:00 a.m. and 14:00 p.m. and the sex of all emerged flies was recorded. All pupae were originated from one tray of larval media. The pupae were ranked by weight and the number of male and female flies which emerged from each weight class (1mg) were recorded. The total fly emergence was then plotted by sex as percentage of total pupae against percentage of the greatest weight.

Results and Discussion

1) **Life cycle:** The results obtained from the rearing stable flies under room condition and from large rearing cage were shown in table 1.

Table 1. Developmental period (days) of larval, pupal, preoviposition and adult stages at different temperature condition.

Month	Min. temp.	Max. temp.	Mean temp.(°C)	Period in days			Longevity of adult(days)
				Larva	Pupa	Preoviposition	
Sep. '73	23.4	25.8	24.6	8.5	7.0	12.0	30.0
Oct. 〃	23.8	26.7	25.3	8.0	6.0	10.0	30.0
Nov. 2〃	25.6	31.3	28.3	8.5	6.5	11.0	—
Dec. 〃	24.4	29.7	27.1	7.3	6.7	11.0	—
Jan. '74	22.2	29.9	26.1	7.0	6.0	11.0	—
Feb. 〃	23.2	31.2	27.0	7.0	6.5	8.0	—

For the period from September 1973 to November 1973, the room temperature was electrically controlled and where 15 to 16.5 days for developing from egg to adult, 11 days for preoviposition and 30 days for mature adult were observed. However,the vinyl covered rearing chamber controlled by automatic electric heater to maintain relatively constant temperature from December to February, 1974, 14 to 15 days from egg to adult and 11 days for their preoviposition were observed.

The slightly warmer condition shorten the stages from egg to adult and preoviposition period and lengthens the period of a mature adult stage. The effect of warmer temperature was markedly observed where the mean temperature was 27±1°C. It was observed that it took 15 days to complete the development, and 8 days for preoviposition. The preovipositional period was shortened in 8 days and this shortened period of 3 days may be ascribed to frequent blood feedings or flooding with warm tap water to seperate pupae medium.

2) **Segregation of stable fly puae by sex:** Since both sexes of this fly are obligate blood feeders, it will be necessary to keep the number of released insects below the thresholds of annoyance. A method of regulating or removing females from the released insects would help to alleviate the problem. So present preliminary test has completed, and the method separating the pupae by sex based on the percentage of the greatest weight of each colony appears to be satisfactory (Fig. 1).

About 60% of the pupae which produced males weighed more than 25% of the weight of the heaviest pupae, there was no good sex separation based on time of the adults (Fig. 2).

Bailey (1970) and Bailey *et al.* (1970) modifled a a forced air method developed by Henneberry *et al.* (1964) that successfully sexes stable fly adult

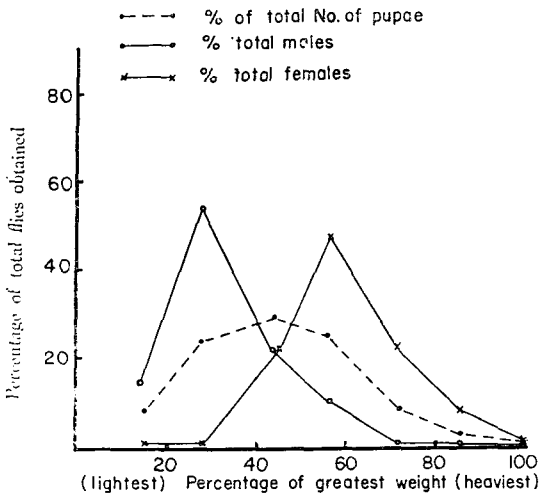

Fig. 1. Relationship between fly sex and pupal weight.

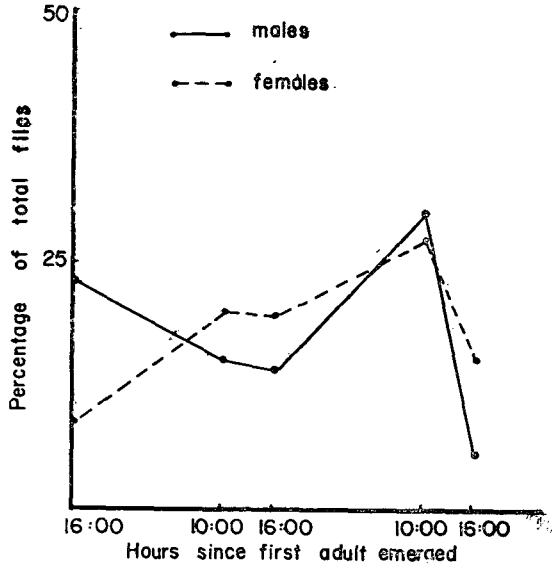

Fig. 2. Relationship between length of pupal period and sex of adult flies emerged.

stage. But segregation of pupae or adult stage method can be used with only small numbers.

3) **Pupal weight:** To determine the effect of alternation of generation, the pupal weight were determined from the 5th generation to 20th generation. These results are shown in table 2.

The 5th generation (mean temperature 17.6°C) and 10th generation (23.9°C) pupal mean weight of 12.58 mg and 12.7 mg respectively were obtained. However,

Table 2. Comparison of the pupal weight according to the alternation of generations.

Generation	Mean temp.	Pupal weight
5	17.6	12.58
10	23.9	12.7
12	25±1	13.3
15	27±1	13.24
20	27±1	13.25

at the 12th generation (25±1°C), 15th generation (27±1°C) and 20th generation (27±1°C) pupal mean weight of 13.3mg, 13.24mg and 13.25mg were obtained, respectively. These results seem to indicate that advance of generation has not effect on pupal weight, whereas the temperature has an effect on the pupal weight.

Abstract

The vinyl-shielded rearing chamber was controlled by automatic electric heater to maintain relatively constant temperature and under this condition, it took 13 to 14 days from egg to adult and 8 days for their preoviposition. The pupal weight was not varied with the advance of generation, whereas was greatly effected by temperature changes.

Since only 60% of the pupae was able to classify the sex by pupal weight, a mechanical device will be needed for the further sexing.

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