

Larval Diets for Production of Melon Fly in Okinawa

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Introduction

WATANABE *et al.* (1972) described a rearing medium for larval culture of the oriental fruit fly, *Dacus dorsalis* HENDEL, using corn flour, brewer's yeast, toilet tissue, butyl *p*-hydroxybenzoate and about a half amount of water, subsequently, boiling the mixture for 10 minutes and adding the remaining water in order to cool the mixture. Other ingredients as required were then added and mixed in thoroughly. This medium in conclusion was also found to be suitable under laboratory conditions for production of the melon fly, *Dacus cucurbitae* COQUILLET.

As corn flour is not commercially available in Okinawa, we investigated the market for availability of a suitable substitute which would be economically feasible as a bulking material. Conjointly, we searched for other inexpensive substitutes. Several varieties of wheat for animal use, we found out, were commercially available. Crude dry yeast, much less in cost than brewer's yeast, a water-binding synthetic thickener as a moisture control agent and other necessary ingredients were also available. All these items were procured. We then attempted a series of experimental tests on growth and development of the melon fly using the above ingredients in various mixtures.

Materials and Methods

Varieties of wheat bran from Okinawa Flour Milling Co., crude dry yeast from Orion Breweries Ltd. and Serogen-F (Na-CMC, Sodiumcarboxymethyl cellulose) from Dai-Ichi Kogyo Seiyaku Co., Ltd. were used. Five larval diets of various formulae were prepared.

A total of four different kinds of wheat bran are produced locally, which can be identified by the variety of wheat used and the percentage of bran residue remaining after sifting of flour as follows: White bran (Western White, 22 to 25% residue); Dark bran (No. 1 Canada Western Red Spring Wheat, 22 to 25% residue); Special bran (Dark Hard Winter, 60% residue); and Mixed bran (White 35%, Dark 15%, and Special 50%).

The method is as follows; granulated sugar, crude dry yeast, sodium benzoate and hydrochloric acid were mixed with a half amount of water in a container. Wheat bran, well mixed with Na-CMC, was added with the remaining water, then thoroughly mixed. A pH meter was used for measuring the acid-alkali ratio.

Laboratory adult flies were used to obtain eggs. Egg receptacles, with inner walls lined with organdie dipped in synthetic melon essence (NOHARA, unpublished), were used for eggging. These eggs were all collected within a 20-hour period. Approximately 500 ml of rearing medium was placed in each container to a depth of 2 to 3 cm. About 3,800 eggs, measured off volumetrically (0.4 ml), were placed on the medium surface of each container with screen lid attachments. The containers were then stored in the biotron (a constant temperature and humidity room) at a controlled temperature of 27 to 28°C and at 70-80% R.H. The full-grown larvae were then transferred into pupating containers filled with slightly moist sand. Seven days after pupation, the pupal number

was counted, followed by random sampling of 50 pupae and a pupal weighing. Thus, the larval period, percentage recovery of pupae and mean pupal weight were used for evaluating the media. Using a fresh mixture for each trial, the experiments were replicated three times for each medium.

Results and Discussion

Table 1 shows the tested larval diets. Figure 1 summarizes the data obtained on larval development and pupal weight. The larval period in all tests carried out was 5 days. The percentage recovery of pupae and pupal weight, however, denote some variation. Of 5 diets tested, diets A and B represent the highest percentage recovery and heaviest pupal weight.

The volume of water used in the preparation of mixture varied with each diet depending on the quantity of flour attached to the processed bran. Proportionate to this quantity, the desirable

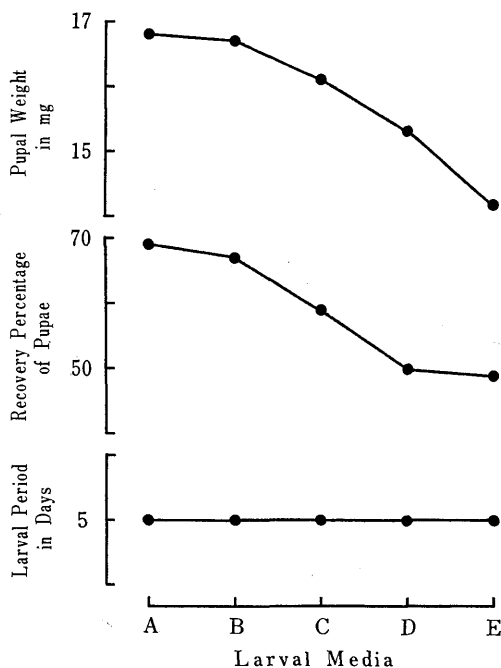


Fig. 1 Larval media and development.

Table 1. Larval media examined

Ingredient	A	B	C	D	E
Wheat bran (g)					
White bran	35	0	30	0	0
Dark bran	0	0	0	35	30
Special bran	0	0	5	0	5
Mixed bran	0	35	0	0	0
Granulated sugar (g)	5	5	5	5	5
Crude dry yeast (g)	5	5	5	5	5
Conc. HCl (ml)	1.0	1.0	1.0	1.2	1.0
Sodium benzoate (g)	0.15	0.15	0.15	0.15	0.15
Na-CMC (g)	1	1	1	1	1
Water (ml)	100	100	90	100	106

texture of mix determined the amount of water that was used in the diet preparation. There was no need to boil the mixture. Similar to the larval medium using Gelgared M powder (TANAKA *et al.*, 1969), the desired level of moisture was maintained by Na-CMC as a substitute for toilet tissue. The medium with a soft moist consistency was obtained, the pH of which ranged from 4.5 to 4.8. The high of 4.8 represented a mixture only when white bran was used. The white bran mixture with the pH value less than 4.8 was found to be unsuitable for rearing, and required an acidity addition to bring the pH of the medium to 4.8.

Based on the series of tests conducted, the rearing of melon fly larvae using a mixture of wheat bran, crude dry yeast and Na-CMC proved just as effective as the other conventional methods. Also, the ingredients are readily available at comparatively low cost in Okinawa. Therefore, the formulation as described points out the possibility of its use in mass production. The use of this diet mixture has also been confirmed as very satisfactory for production of the oriental fruit fly. Follow up experiments using trays for mass rearing are required.

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Summary

A satisfactory low-cost larval rearing medium for production of both the melon fly and the oriental fruit fly using wheat bran, crude dry yeast and Na-CMC (a synthetic thickner) substituted for corn flour or refined dry yeast and toilet tissue was developed under laboratory conditions. After due follow up experiments using trays, this new larval medium will be of great use in mass production of the fruit flies.

References

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摘 要

沖縄におけるウリミバエの幼虫飼料

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コムギフスマ, 粗製乾燥ビール酵母, 砂糖, 食品添加物合成糊料 Na-CMC, 安息香酸ナトリウム, 塩酸及び水を使って, ウリミバエの幼虫人工飼料を作った。この飼料はトウモロコシ粉で作った飼料にくらべ, 経費を大

幅に軽減し, しかも, これらの材料は沖縄において容易に入手できる。これらの材料を混合する際煮沸は不要である。この飼料はミカンコミバエの幼虫飼育にも利用できた。