Control of Housefly (*Musca domestica* L.) in Dairy Barn of Jersey Cattle

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ABSTRACT

The experiment to control houseflies *(Musca domestica* L.*)* in the Jersey herd at Anand was conducted after screening the commonly available fly attractants viz., mixture of 5% milk+5% sugar, 10% sugar, 10% milk, 10% jaggery, 10% honey and insecticide having less repellency to flies viz., 2% malathion, 2% diazinon, 2% arprocarb and 2% trichlorfon. Among attractants, the mixture of 5% milk +5% sugar was found better than the others whereas, among insecticides trichlorfon was significantly less repellent than other insecticides. To determine the effectiveness of this combination, an experiment was then conducted by using cotton cords (0·4 cm thick) treated with 5% trichlorfon and attractant mixture of 5% milk+5% sugar. It was observed effective in maintaining the fly population at low and tolerable level during fly breeding season if cords were applied at the rate of one metre per sq m floor area and treatment was replenished every four weeks. *(Received on Oct. 6, 1975).*

INTRODUCTION

HOUSEFLY (*Musca domestica* L.) is one of the very serious household pests throughout the country. Besides the annoyance caused by them, they carry and transmit a number of diseases of man and domestic animals. The exotic Jersey animals imported for hybridization with local cattle needed great care and protection against local diseases. The houseflies were therefore required to be controlled effectively in the dairy barns of the Anand Campus of the Gujarat Agricultural University.

Several methods such as conventional sprays, residual sprays, solid or liquid poison baits, chemosterilants, microbes, insecticide impregnated cords or strips etc. have been tried for the control of adult houseflies. Baker, Scudder and Guy (1947), Piemental, Schwardt and Norton (1951), Fay and Lindquist (1954), Kilpatrick and Schoof (1956), Gratz, Sacca and Keiding (1964), Sehgal and Kumar (1965), Treece and Miller (1966) and Hayashi and Hatsukade (1970) have reported different insecticides such as DDT, dieldrin, parathion, diazinon, dichlorvos, trichlorfon, dimethoate etc. impregnated on cords or strips at 5 to 10% concentration to be very effective for the control of adult flies. Lancaster and Simco (1969) and Pausch (1971) reported that the chemosterilants such as apholate, hempa, metepa, tepa etc. impregnated on cords were highly effective for causig the steri-

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lity in houseflies in laboratory as well as in dairy barns. Buck (1915) and Richardson (1917) have reported sucrose and milk as effective attractants. The effectiveness of the combination of insecticide and attractant for the control of adult houseflies has not been tested thus far. Trials were therefore conducted in the present investigations by using cotton cords treated with insecticide and attractant.

MATERIALS AND METHODS

Since the purpose of the research was to devise safe and effective measures to control the adult fly population, tests were conducted to select the best fly attractant, and the best insecticide which had least detering effect and which killed the flies for a longer period of time. The attractants compared were 5% milk + 5% sugar, 10% sugar, 10% milk, 10% honey, 10% jaggery and water (control). A 30 cm long cotton cord (0·4 cm thick) was soaked in each of the above solutions for four hours and then allowed to dry for 24 hours. The cords soaked in different attractants were tagged for identification. A cylindrical iron frame cage made of two 20 cm diameter-rings at either end connected by 4 thin rods on the sides and covered with fine nylon cloth was used for exposing the cords to the flies. All the six cords treated with different solutions were suspended equidistantly in the cage (Plate 1). Adult flies collected from the dairy barn were anaesthetized with CO_2 for convenience of counting and handling. Fifty flies were introduced in the cage and the number of flies sitting on each cord was recorded. They were then disturbed, allowed to settle and after 2 minutes the count was recorded again. In all, 10 such counts were taken to derive the average number of flies sitting on each of these cords. Such observations were taken at weekly intervals using the same cords so as to know the duration of the attractiveness of these materials. After recording the observations, the cords were suspended in the dairy barn so as to allow the weathering effect on the cords under natural conditions.

To determine the duration of effectiveness of different insecticides charged on cords for the control of houseflies, the following treatments were compared in the laboratory:

1. 5% arprocarb + 5% milk + 5% sugar.
2. 5% dimethoate + 5% milk + 5% sugar.
3. 5% trichlorfon + 5% milk + 5% sugar.
4. 5% milk + 5% sugar (Control).

The treatment materials were prepared in 250 ml beakers. Weighed quantities of milk powder and sugar were added and dissolved in desired quantity of water. Measured quantity of insecticide formulation was then added and thoroughly mixed. Each treatment included a set of 4 cotton cords (0·4 cm diameter) measuring 30 cm in length. The cords were soaked in each of the above materials for

TABLE 1.

The number* of houseflies attracted on cotton cords treated with different attractants.

No. of week	*No. of flies attracted to*						
	5% Milk +5% Sugar	*10% Sugar*	*10% Milk*	*10% Honey*	*10% Jaggery*	*Water (Control)*	*Week Average*
0	4·4	3·6	4·0	1·8	2·6	0·9	2·883
1	3·4	2·7	2·8	1·8	2·2	1·2	2·350
2	3·2	2·7	2·5	1·7	2·1	0·9	2·188
3	2·6	2·7	2·4	1·8	2·0	1·4	2·150
4	2·4	2·5	2·1	1·6	1·9	1·2	1·950
5	2·2	2·2	2·3	1·6	2·3	1·5	2·016
6	2·4	2·3	2·0	1·9	2·1	1·4	2·016
7	2·3	2·2	1·8	1·8	2·2	1·7	2·000
8	2·3	2·0	2·2	1·7	1·9	1·8	1·983
Treatment average	2·800	2·544	2·455	1·744	2·144	1·333	—

S. Em. For treatment = 0·424
C.D. @ 5% = 1·211
C.V. % = 18·5

* Average of 10 observations.

4 hours and then allowed to dry for 24 hours.

These sets of the treated cords were suspended in nylon cloth lined cylindrical iron cages and 50 flies were released in each of them. After 60 minutes cords were removed and mortality of flies was recorded at an interval of two hours for 24 hours. In the control cage, however, the mortality was recorded after 2 and 24 hours only. The same cords were tested for their effectiveness at weekly intervals and were then suspended in the dairy barn so as to allow degradation of the insecticide as it would occur under normal barn conditions.

Trichlorfon which was found to be quite satisfactory material because of its less repellency and long residual effect when applied on the cotton cords, was further tried in all the 12 dairy barns of the Jersey herd of the I.D.C. (Indian Dairy Corporation) Project as bait having residual effect. Cotton cords treated with 5% trichlorfon + 5% milk and 5% sugar were tied horizontally about 2 metres high from ground level so as to allow one metre cord length per sq m floor area. To determine the efficacy of the treatment, the fly population in a Kankrej herd located at about one kilometre away was also recorded simultaneously as control. The population of the flies was recorded by taking grill

counts of flies as suggested by Scudder (1947). For this purpose, a wooden grill of 90 cm × 90 cm was constructed by fixing 2·0 cm wide 0·6 cm thick strips at 2·0 cm apart on 'N' shaped wooden frame (Plate 2). To take the counts, the grill was placed on a levelled spot in the barn where large number of flies were congregating. The flies settling on the wooden strip of the grill were counted after two minutes and then they were disturbed. The flies were then allowed to settle to take the count again. Five such counts were taken at each spot out of which the highest count was taken as a grill count at that spot. Such a grill count was taken from three spots in each of the barns which were averaged to arrive at the grill count of the barn. Since the treatment was given in all the barns, such counts of each of the barns were averaged so as to derive the average grill count of the dairy premises. The grill counts were taken before fixing the treated cords and subsequently at weekly intervals so as to evaluate the effect of the treatment. The treatment of the cords was repeated at an interval of 4 weeks.

RESULTS AND DISCUSSION

Attractants:

The results of experiment conducted to decide the most suitable attractant for use in the bait to be applied on the cotton cords are presented in Table 1.

The statistical analysis of the data showed that among all the treatments only mixture of 5% milk and 5% sugar was significantly more attractive to flies as compared to the control. The treated cords were quite attractive when the treatment was fresh. However, after a week their effectiveness reduced sharply. Thereafter, the decline in the attractiveness was found to be slow and continuous during the eight week period. This is reflected in the number of flies in control cords which has increased slowly and continuously during the experimental period. Thus, a mixture of 5% sugar and 5% milk which appeared to be slightly more attractive was used in further experiments to compare insecticides.

Comparison of trichlorfon, arprocarb and dimethoate for control of houseflies:

The results of the laboratory experiment conducted to determine the residual effect of trichlorfon, arprocarb and dimethoate applied on cords with 5% milk and 5% sugar as attractant are given in Table 2. The numbers of hours required to get 100% mortality of flies with 5% trichlorfon, 5% dimethoate and 5% arprocarb treated cords are plotted in Fig. 1.

The cords treated with 5% arprocarb gave 100% mortality of flies within 4 hours of exposure upto six weeks and within 14 hours in the 7th week. Thereafter, it failed to give 100% mortality even within 24 hours. Thus, it can be inferred that the insecticide was quite active until 6 weeks after treatment and lost the effectiveness very rapidly thereafter.

In the case of dimethoate, 100% mortality was obtained within 4 hours

TABLE 2.

Percentage mortality of houseflies in 24 hours after 60 minutes exposure to the cords treated with different insecticides.

Weeks Old Cords		% *mortality of adult houseflies after hours*												*Control Treatment*	
		2	4	6	8	10	12	14	16	18	20	22	24	2	24
0	A	100												0	36
	D	100													
	T	100													
1	A	100												4	24
	D	100													
	T	100													
2	A	100												12	36
	D	100													
	T	100													
3	A	100												2	28
	D	98	100												
	T	100													
4	A	96	100											2	24
	D	90	100												
	T	100													
5	A	90	100											8	34
	D	88	94	96	96	100									
	T	100													
6	A	88	100											10	52
	D	86	92	92	96	100									
	T	100													
7	A	64	88	96	96	96	96	100						4	36
	D	82	88	94	98	100									
	T	96	100												
8	A	62	76	88	92	92	92	92	92	92	94	94	94		
	D	82	90	92	92	96	96	96	96	96	100			0	30
	T	90	100												
9	A	56	62	78	82	84	84	84	84	84	86	86	86		
	D	88	92	94	94	96	96	96	96	96	96	100		2	22
	T	86	94	96	96	96	96	96	96	96	98	98	98		
10	A	42	48	50	54	54	54	54	58	58	58	60	64		
	D	78	86	86	88	88	88	90	90	90	90	90	90	0	20
	T	80	86	88	88	88	88	88	92	92	92	96	96		

A. 5% arprocarb + 5% sugar + 5% milk. D. 5% dimethoate + 5% sugar + 5% milk.

T. 5% of trichlorfon + 5% sugar + 5% milk. Control. Water containing 5% sugar+5% milk.

TABLE 3.

Housefly grill counts in treated and untreated dairy barns (Treatment—Cotton cords soaked in 5% trichlorfon+5% milk+5% sugar).

Date of Treatment	*Date of Observation*	*Number of Houseflies*	
		Treated barn	*Untreated barn, (Control)*
27-5-73	27-5-73	18.48	22·25
	3-6-73	8·64	24·25
	10-6-73	6·21	20·50
	17-6-73	6·54	23·00
24-6-73	24-6-73	11·50	33·00
	1-7-73	6·41	36·75
	8-7-73	6·41	19·50
	15-7-73	7·62	15·50
22-7-73	22-7-73	8·20	17·75
	29-7-73	6·42	22·75
	5-8-73	7·40	22·00
	12-8-73	8·90	30·25

only for four weeks after the treatment but the loss of effectiveness was gradual even after 10 weeks from the treatment. Thus, dimethoate is more residual but slow acting insecticide for flies.

Compared to arprocarb and dimethoate, trichlorfon treated cords remained highly effective upto 8 weeks giving 100% mortality within 4 hours of exposure. The effectiveness then declined rapidly and failed to give 100% mortality even in 24 hours.

Adult fly control using cotton cords treated with 5% trichlorfon:

Since the bait prepared with trichlorfon applied on the cotton cords proved very satisfactory for the control of flies, it was tested in the field by fixing trichlorfon treated cords in the dairy barns and keeping record of the changes in fly population in the treated barns as well as in the control barn. The results presented in Table 3 show that the grill counts on the treatment date are pretreatment counts and that the treatments given at the interval of 4 weeks have given satisfactory control of the flies. The grill counts in control barn showed that the changes in population were very insignificant. On the other hand, the pre-treatment grill counts in treated barn and the counts taken at weekly intervals thereafter clearly show that the treatment was very effective in keeping the population at a very low level during the 3 month experimental period.

Thus, from the results it can be concluded that use of cotton cords (0·4 cm diameter) treated with 5% trichlorfon and attractant mixture of 5% milk and 5% sugar is effective in maintaining the fly population at low and tolerable level during the fly breeding season if the cords are applied in the barn at the rate of one metre per sq metre and the treatment is replenished every four weeks. As against this, Sehgal and Kumar (1970) had found trichlorfon in molasses solution soaked in pieces of cotton or cloth in small dishes to be effective only for one week.

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