

The Effect of Colors on the Attraction and Aggregation of the Houseflies (*Musca domestica L.*)

Asst. Lecturer Nihad. M. Abdul Fattah
Department of Science
College of Basic Education / University of Mosul

Received: 25/4/2011 ; Accepted: 31/7/2011

Abstract:

The objective of this study was to note the attraction and aggregation behavior of wild type strain of house flies *Musca domestica L.* among different colors. So we can identify the best color for trap and to chose the color with least houseflies attraction which can be used for different purposes such as jar bag sacs and butchers shop wall painting, dairy product. So we studied the effect of four colors on the attraction and we found that the black color is the most attractive followed by green, yellow and white.

تأثير الألوان في جذب وتجمع الذباب المنزلي (*Musca domestica L.*)

م.م. نهاد مصطفى عبد الفتاح
قسم العلوم
كلية التربية الأساسية / جامعة الموصل

ملخص البحث:

الغرض من هذه الدراسة هو ملاحظة سلوك الجذب والتجمع للسلالة البرية من الذباب المنزلي *Musca domestica L.* لالوان مختلفة وذلك لتحديد افضل لون للمصائد واختيار اللون الاقل جذبا للذباب المنزلي الذي يمكن ان يستعمل لاغراض مختلفة مثل اكياس القمامة وجدران محلات القصابة ومنتجات الالبان لذا تمت دراسة تأثير اربعة الوان في الجذب ووجد ان اللون الاسود هو الاكثر جذبا يتبعه الاخضر والاصفر ثم الابيض.

Introduction:

Houseflies *Musca domestica L.* are vectors of a wide range of pathogens including human diseases such as cholera (1), typhoid, dysentery, diarrhea, gastroenteritis (2, 3), *Escherichia coli* and *Shigella* specious. (4, 5, 6). Houseflies show marked preference for resting on

surfaces with contrasting visual patterns (7, 8, 9). The environmental influences on insect behavior patterns has been successfully incorporated into studies of ecology so that colors of the background play an important role to attract house flies. Many colored lights are being used (10). Houseflies in their daily lives encounter a wide variety of materials in various physical forms including colors, but the attractiveness of many traps of house flies have not been evaluated. Traps come in many shapes as simple as paper with a sticky surface. Among a simplest and oldest traps are fly strips or fly paper which has been used for more than a hundred years (11). For many years effective control was achieved using contact insecticides applied by spraying. However, this approach has resulted in the wide spread development of insecticide resistances (9, 12, 13). In the laboratory studies on the response of *Musca Domestica* to colors, it was suggested that they preferentially settle on black or red surfaces, and avoid blue or white surfaces (14, 15). The optical sensitivity of the housefly lies between 310nm and 700nm which effect the attraction to certain colors and enable us to chose the favorite color of traps (16).

Materials and methods:

Three jar bag in different places in Mosul city where chosen and the traps with different colors (black, green, yellow and white) were located in an open area with high flies activity near the jar bag (arranged in circle series 1 meter apart around the jar bag and 80cm above the ground; three traps for each color were used.

The trap is a colored paper (7.5cm *46 cm) covered with adhesive material (rat glue commercially known as atrarat), fixed on a wood stick and the traps collected after 12 hours (day light) and the number of house flies presents on the trap were counted. The traps used at the same time as mentioned above to exclude the effect of other environmental factors such as humidity and temperature which may affect the attraction.

Results:

Tables (1, 2, 3) shows the mean number of houseflies in the different locations. We use SAS program in the analysis of our data and we identify the significance of different colors which affect the attraction using one way ANOVA and Duncan's Multiple Range Test for variable.

Table (1) : 1st location

Color	Mean
Black	24.73 a
Green	12.80 b
Yellow	9.86 c
White	10.70 c

Means within columns followed by the same letter are not significantly different at P=0.05 (one way ANOVA and Duncan's Multiple Range Test for variable).

Table (2) : 2nd location

Color	Mean
Black	31.10 a
Green	15.30 b
Yellow	12.26 c
White	10.40 d

Means within columns followed by the same letter are not significantly different at P=0.05 (one way ANOVA and Duncan's Multiple range test for variable).

Table (3) : 3rd location

Color	Mean
Black	33.00 a
Green	20.70 b
Yellow	16.00 c
White	12.50 d

Means within columns followed by the same letter are not significantly different at P=0.05 (one way ANOVA and Duncan's Multiple Range Test for variable).

Black color traps had a maximum number of flies in the three locations for all days (according to our statistical analyses): 24.73, 31.10, 33, respectively and these results are significantly different from other colors (compared with the green yellow and white) whereas green is the 2nd favored color for houseflies followed by yellow and white. The white color is the least attracted color (minimum number of houseflies) in two locations (2nd and 3rd location) and have the same degree of attraction with yellow color in the 1st location.

Discussion:

The results of this experiment in the open air showed that the maximum numbers of houseflies attracted to the black traps (black color) while the least number of houseflies attracted to white color and these results are similar to a study done by Otto *et al.*, (16) who identify the black color as the favorite color while the white color as the least attraction unless it is mixed with other colors (yellow or green).

Ahmed *et al* (17) found that black color attracted the maximum number of flies and significantly different from other colors but their work was in the laboratory "they also found that the black is more favorite to the houseflies to the housefly and the white color shows the minimum attraction and these results are similar to our works.

Geden (18) works in dairy farm and his results are different from ours as he found that the blue color has the most attraction ability to the

housefly especially in the presence of Alsynite (this is the commercial name of special trap in U.S.A).

Hanley *et al* examined the colors as an attractant in a commercial poultry unit when they use blue paint green paint yellow paint and white paint and unexpectedly he found that the trap color has no significant effect on housefly catches, but he didn't study the effect of the black color which is the most important color in our study.

From our study and all this literature, we notice that the attraction of houseflies affected by many factors and we study only the color effect during the day light and it is still a matter of controversy probably because of different behavior of houseflies according to the strain (we use the wild type strain) and there is a study performed by Grutzmacher and Nakano shows that behavior of flies may also vary at different time points as normally seen that at night flies congregate at the white rope piece of cloth which extremely different from daylight (10).

Finally, we have to mention that trails conducted in field condition have often yielded results contradictory to those of laboratory experiments (8,20)

Conclusion:

The goal of this study is achieved and we identify the most attractive color to houseflies which is the black and the least attractive color which is the white so we can use these colors as traps (with or without insecticide) by choosing the black color paper or use white, yellow sac for jar bag to avoid the aggregation of houseflies.

References:

- 1- kotenok, Ya F. and Chicherin, Yu. V. 1977. Domestic flies (*Musca domestica* L.) as a vector of cholera causative agent (Dipt., Muscidae)
Zh. Microbiol. Epidemiol. Immunobiol. **45** (12): 23-27.
- 2- Pont. A.C1973. *Muscidae* pp.251-269. In Smith, K.G.V. 1973. *Insect and other Arthropod of medical importance. Trustees of the British Museum (Natural history)* pp.561.
- 3- Wolff, H.L; Van Zijl, W.J. and Roy, M. 1969. Houseflies, the availability of water and diarrheal diseases. *Bull. World health organization.* **41**(6): 952-959.
- 4- Buma, R.H., Sanada, T. Maeda, M. Kamei, and H. Koura: 1999. Isdation and characterization of pathogenic bacteria, including *Escherichia coli* O157: H7, from flies collected at dairy farm field. *Med. Entomol. Zool.* **50**: 313-321.
- 5- Kobayashi, M., T. Sasaki, N. Saito, K. Tamura, K. Suzuki, H. Watanabe, and N. Agui. 1999. Houseflies: not simple

- mechanical vectors of enterohemorrhagic *Escherichia coli* O157:H7. *Am. J. Trop. Med. Hyg.* **61**: 625-629.
- 6- Nayduch, D. and F. Stutzenberger. 2001. The house fly (*Musca domestica*) as a vector for emerging bacterial enteropathogens. *Rec. Res. Dev. Microbiol.* **5**: 205-209.
 - 7- Conlon, D. and W.J. Bell. 1991. The use of visual information by houseflies, *Musca domestica* L. (Diptera: Muscidae), foraging in resource patches *Comp. Physiol. A*: **168**: 365-371.
 - 8- Howard, J.J. and R. Wall. 1998. Effects of contrast on Attraction of the house fly, *Musca domestica* to pheromone impregnated targets in poultry units. *Med. Vet. Entomol.* **12**: 223-324.
 - 9- Chapman, J.W., J.J. Knapp, and D. Goulson, 1999. Visual response of *Musca domestica* to pheromone impregnated targets in poultry units. *Med. Vet. Entomol.* **13**: 132-138.
 - 10- Grutzmacher, A.D. and O. Nakano, 1997. Behavior of housefly. *Musca domestica* L. in relation to the use of transparent plastic bags containing water. *An. Soci. Entomol. Brazil.* **26**: 455-461.
 - 11- Douglass. E. Stevenson and Jesse Cocke; integrated pest management of flies in Texas dairies. *Extension associate; Extension entomologist: the Texas A&M University system; Act of congress of may 8, 1914, as amended, and June 30, 1914 in cooperation with the united states department of agriculture: 4-5.*
 - 12- Keiding. J. (1999) Review of the global status and recent development of insecticide resistance in field popular of the housefly, *Musca domestica* (Diptera: Muscidae). *Bulletin of Entomological research*, **89**, 59-67.
 - 13- Shono, T., Zhang, L & Scott J.G. (2004) Indoxacar resistance in the housefly, *Musca domestica*. *Pesticide Biochemistry and Physiology*, **80**, 106-112.
 - 14- Waterhouse, D.F. (1984) the effect of colour on the number of houseflies resting on painted surfaces. *Australian Journal of Scientific Research*, **1**, 65-75.
 - 15- Hecht, O. (1963) on the visual orientation of house flies in their search of resting sites. *Entomological Experimentalis et Applicata*, **6**, 94-98.
 - 16- Otto, Hect, Raul Muniz and Andrea Nava. (1967). Contrary response of *Musca domestica* concerning their selection of different shades and hues. *Ent. Exp. & appl.* 11 (1965) 1-14, *North Holland Publishing Co, Amesterdam.*
 - 17- Ahmed, S., Zia. K. and Akhtar, I. (2005). Response of housefly *Musca domestica* L. to a Baiting System. *International Journal of agriculture and biology.* **3**: 424-426.

- 18- Geden, Christopher, J. (2006). Visual Targets for Capture and Management of Houseflies, *Musca domestica* L. *Journal of vector Ecology* **31** (1): 152-157.
- 19-Hanley, M.E., Dunn, D.K., Stewart, A. and Goulson, D. (2008). Luring houseflies (*Musca domestica*) to traps : do cuticular hydrocarbons and visual cues increase catch. *Medical and Veterinary Entomology*.
- 20- Hanley, M.E. Dunn, D.K., Abolins, S.R., & Goulson, D. (2004). Evaluation of (Z)-9- tricosene baited targets for control of the housefly (*Musca domestica*) in outdoor situation. *Journal of Applied Entomology*, **128**, 478-482.

This document was created with Win2PDF available at <http://www.daneprairie.com>.
The unregistered version of Win2PDF is for evaluation or non-commercial use only.