# Seasonal Activity of Flies Causing Myiasis in Livestock Animals Using Sticky Traps Baited With Swormlure-4 in Riyadh Region, Saudi Arabia

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## Abstract :

Flies causing myiasis were monitored using sticky traps baited with swormlure-4 in El Muzahmiya, El Ammariya, El Dirrhiya and Hurymila (Riyadh Region). Three fly species were attracted; these were *Chrysomya albiceps, Wohlfahrtia nuba* and *Chrysomya bezziana*. In all sites**,** the mean numbers of *C. albiceps* were significantly higher than the mean numbers of *W. nuba* ($P<0.05$); on the other hand, the numbers of *W. nuba* were significantly higher than the numbers of *C. bezziana* ($P<0.05$). The ratios of *W. nuba* : *C. albiceps* in El Muzahmiya, El Dirrhiya, Hurymila and El Ammariya were 1: 7.0, 1: 5.3, 1: 4.3 and 1: 3.5, respectively. Two distinct peaks were observed for the seasonal activity of *C. albiceps* and *W. nuba* flies; in April and November. Their distribution and seasonal activity may be influenced by the prevailing climatic conditions and the availability of hosts. The study revealed that flies causing myiasis are becoming serious pests in Riyadh Region, and every effort should be made to control them, by sanitary measures and insecticides and other means of integrated pest management.

## Introduction:

Myiasis constitutes a major threat to the development of livestock industry (Zumpt, 1965). *Chrysomya bezziana* Villeneuve, *C. albiceps*, (Wied) and *Wohlfahrtia nuba* (Wied) are the main flies responsible for causing dermal myiasis in Saudi Arabia (Alahmed, 2001 and Badawi, 1994). Decomposing beef liver was an effective screw-worm fly attractant for research purposes, but it never became widely used in surveys, because of its decaying characteristics and it also attracts many other insects. In contrast, a chemical attractant called swormlure-2 (SL2) has been developed as an effective attractant for flies that cause myiasis (Coppedge *et al*, 1977). Extended field exposure of SL2 results in a rapid loss of the more volatile components from the mixture, particularly in humid tropical areas. To improve SL2 attractiveness, swormlure-4 (SL4) has been developed by Mackley *et al* (1984).

Despite the importance of flies that cause myiasis to livestock in Saudi Arabia, little is known about their distribution and abundance. Therefore, a study of their distribution and seasonal activity in Riyadh Region, using sticky traps baited with SL4 was done.

**Materials and Methods:**

For survey of flies causing myiasis in Riyadh Region, 4 farms were selected at El Muzahmiya (80 km W.), EL Ammariya (50 km N.W.), El Dirrhiya (30 km. NW) and Hurymila (100 km N) of Riyadh city. El Muzahmiya is an animal farm which belongs to the Department of Animal Production, College of Agriculture, King Saud University, and more than 100 camels and few numbers of sheep and goats are kept in the farm. Most of the animals in EL Ammariya, El Dirrhiya and Hurymila farms are mainly sheep and goats, in addition to some cattle. The survey period extended from October 2001 to June 2003, during which each farm was visited once every two weeks. In each visit, 3 black sticky traps (35X30 cm) baited with SL4 were distributed 50-100 meters apart near animal pens, then colleted next day. Swormlure-4 (Mackley and Brown ,1984) was prepared as shown in table (1).

Table (1)
Concentration of chemicals used in preparation of Swormlure-4

| Chemical | Concentration | Volume |
|---|---|---|
| Sec-butyl alcohol | 18.7% by volume | 187 ml |
| Iso-butyl alcohol | 18.7% by volume | 187 ml |
| Dimethyl disulphide | 18.7% by volume | 187 ml |
| Acetic acid | 18.7% by volume | 187 ml |
| Butyric acid | 6.2% by volume | 62 ml |
| Valeric acid | 6.2% by volume | 62 ml |
| Phenol | 5% by volume | 50 ml |
| P-cresol | 5% by volume | 50 ml |
| Benzoic acid | 1.2% by volume | 12 ml |
| Indole | 1.2% by volume | 12 ml |

In mixing up the ingredients for SL4, the solid components were weighed first, and placed into a glass container in a warm water bath to dissolve them. Then liquid components were measured and added to the contents of the glass container in any order, but dimethyl disulphide was added last (because of its nasty smell). The compounds were mixed gently and kept at room temperature.

The shelf life of each batch is one month (most of these chemicals are carcinogenic and they should be handled with care).

Forty ml of SL4 were placed into a vial (60 ml glass) with No. 2 dental cotton wick extending 1.5 cm above the mouth of the vial as a dispensing agent, and the vial was placed at the center of the sticky trap which was put at the ground level. The collected traps were transported to the laboratory in a container with blue ice (Rubbermaid incorporated, Wooster, OH, USA) to minimize the temperature inside the container. Adult flies were removed carefully from the sticky traps by pulling them off gently with forceps or by using an organic solvent such as white spirit. The removed flies were identified according to Zumpt (1965) and Spradbery (1991) and recorded. Other insects were also recorded. Daily minimum and maximum temperature, R.H and rainfall were recorded over the survey period (Table 2). For statistical analysis, ANOVA was done (SAS, 1987).

**Results and Discussion:**

During this survey, three fly species which cause dermal myiasis were caught (Table 2); these were *Chrysomya albiceps, W. nuba* and *C. bezziana.* In all four sites, *C. albiceps* (Fig.1) was significantly higher than *W. nuba* ($P < 0.05$); on the other hand, *W. nuba* (Fig.2) was significantly higher than *C. bezziana* ($P< 0.05$). *C. bezziana* was caught in very low numbers when compared to the other two species (Table2), but it was significantly higher at El Ammariya than the other sites ($P<0.05$). The ratios of *W. nuba* to *C. albiceps* in El Muzahmiya, El Dirrhiya, Hurymila and El Ammariya were 1: 7; 1: 5.3; 1: 4.3 and 1: 3.5 respectively (Table 3).

The Results showed a strong negative correlation between the mean numbers of *C. albiceps* and *W.nuba* caught at all sites(Table 4) and the mean monthly temperature ($P<0.01$ ; $r=0.28$ and $P<0.01$; $r=0.24$ respectively). Similarly, there was a strong positive correlation between the total numbers of *C. albiceps* and *W.nuba* caught at all sites and the mean monthly relative humidity ( $P<0.01$ ; $r =0.39$ and $P<0.01$ ; $r =0.29$ respectively). From these results it seems that the distribution of *C. albiceps* and *W. nuba* flies may be influenced by the prevailing climatic conditions, such as temperature and humidity and probably the availability of hosts. Two distinct peaks were observed for the seasonal activity of *C. albiceps* and *W. nuba* during the year, in April and in November, where the moderate temperature and R.H. may favor the seasonal activity and development of insect population (Table 4). However, in the second year (Figs 1& 2), the number of flies attracted were

less than in the first year; this might be due to the low rainfall and in the second year. During this survey, many other insects, such as *Sarcopha sp., Musca sp.* and *Calliphora sp.* were also captured.

Although *C. albiceps* was the most abundant fly in the four sites (Table 4), yet the larval survey carried out in the same area during the same period (Alahmed, 2003) revealed that 87% of larval myiasis cases were due to *C. bezziana*, 9 % due to *C. albiceps* and 4% due to *W. nuba*. This is opposite of what has been found, and it suggests that important behavioral differences among the three fly species may exist in their ability to cause dermal myiasis. Dermal myiasis caused by fly larvae of *C. megacephala*, *C. albiceps*, *C. bezziana* and *W. nuba* in livestock in Saudi Arabia has been reported on several occasions (Alahmed, 2001; Ghandour , 1988 and Ramadan *et al*, 1980).

Although SL4 is a specific attractant for *C. hominivorax* (Mackley and Brown, 1984), during this survey very few number of *C. bezziana* were caught, this may suggest that either the density of *C. bezziana* in the area is very low, or there are some important differences in the behavior of *C. hominivorax* and *C. bezziana*. In a similar study by Zoe *et al* (1998) they found that Lucitrap (a trap for *Lucillia* sp) baited with lucilure (a commercial attractant for *Lucillia* sp*)* was effective for trapping *L. cuprina* in Tasmania, but ineffective for trapping the same fly species in Hungary, and they attributed these differences in trap catches to the behavior of the two populations. In fact, many new improvements on the dispensing system of SL 4 and the use of odour baited targets for trapping of screwworm flies were discussed by Torr and Hall (1992) and Green *et al* (1993). These improvements should be included in any future control programs to this pest. Further studies on the ecological and physiological behavior of *C. bezziana* in Saudi Arabia are required.

The results of this survey revealed that flies causing myiasis are becoming serious pests in Riyadh Region, and all efforts should be made to control them. The prevention of myiasis is mainly achieved by reducing the number of flies, by sanitary measures and the use of insecticides. It is also necessary to treat the infested hosts.

**Acknowledgement**:

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**Table ( 2 )**

Means and percentage catches of *C. bezziana*, *C. albicep*s and *W. nuba* using swormlure-4 sticky traps in Riyadh Region, Saudi Arabia.

| Site | C. bezziana | | C. albiceps | | W. nuba | |
|---|---|---|---|---|---|---|
| | Mean [a] | No. caught (%) | Mean [a] | No. caught (%) | Mean [a] | No. caught (%) |
| El Muzahmiya | 0.02 ± 0.01b | 2 (11) | 16.8 ± 1.6a | 2117 (31) | 2.8 ± 0.4ab | 304 (22) |
| El ammariya | 0.09 ± 0.03a | 9 (47) | 11.2 ± 1.1b | 1406 (21) | 3.3 ± 0.3a | 408 (29) |
| El Dirrhiya | 0.03 ± 0.02b | 4 (21) | 12.9 ± 1.3b | 1634 (24) | 2.4 ± 0.2b | 306 (22) |
| Hurriymila | 0.03 ± 0.02b | 4 (21) | 13.3 ± 1.3ab | 1672 (24) | 3.1 ± 0.3ab | 390 (27) |
| Total* | 19 (100) | | 6829 (100) | | 1408 (100) | |

**Means within a column followed by different letters are significantly different ( P< 0.05) ±SE.**
**Mean[a] =Number of flies / trap.**
**Total* = Total number of flies caught during the study period.**

**Table ( 3 )**
**Differences in the mean catches of C. *albiceps* and W. *nuba* using swormlure-4 sticky traps in Riyadh Region.**

| Site | C. albiceps | | W. nuba | | W. nuba : C. albiceps |
|---|---|---|---|---|---|
| | Mean [a] ± SE. | No. Caught | Mean[a] ±SE. | No. caught | ratio |
| El Muzahmiya | 16.8 ± 1.6a | 2117 | 2.8 ± 0.4b | 304 | 1:7 |
| El ammariya | 11.2 ± 1.1a | 1406 | 3.3 ± 0.3b | 408 | 1:3.5 |
| El Dirrhiya | 12.9 ± 1.3a | 1634 | 2.4 ± 0.2b | 306 | 1:5.3 |
| Hurriymila | 13.3 ± 1.3a | 1672 | 3.1 ± 0.3b | 390 | 1:4.3 |
| Total* | 6829 | | 1408 | | 1:4.85 |

**Means in a row followed by different letters are significantly different ( P< 0.05).**
**Mean[a] =number of flies/ trap.**
**Total* = Total number of flies caught during the study period.**

**Table (4)**

Mean monthly temperature, relative humidity, rainfall and monthly catches of *C.albiceps* and *W.nuba* in Riyadh Region ,Saudi Arabia.

| Month | Temperature T°C | | Mean % RH | Mean rainfall (mm) | C. albiceps *total monthly catch | W. nuba total * monthly catch |
|---|---|---|---|---|---|---|
| | Max. mean | Min. mean | | | | |
| أكتوبر- ٠١ | 36.1 | 20.2 | 15.3 | 0 | 136 | 28 |
| نوفمبر- ٠١ | 26.4 | 12 | 28 | 0 | 1050 | 166 |
| ديسمبر- ٠١ | 26.1 | 13.1 | 50 | 23 | 703 | 125 |
| يناير- ٠٢ | 19.8 | 8.4 | 51 | 8.3 | 114 | 48 |
| فبراير- ٠٢ | 24 | 9.5 | 36 | 4.7 | 52 | 20 |
| مارس- ٠٢ | 28.6 | 15.1 | 44 | 14.7 | 710 | 138 |
| ابريل- ٠٢ | 34.1 | 18 | 27 | 2.8 | 855 | 130 |
| مايو- ٠٢ | 41 | 23.9 | 14 | 0 | 356 | 87 |
| يونيو- ٠٢ | 43 | 25.5 | 11 | 0 | 109 | 26 |
| يوليو- ٠٢ | 45 | 27.1 | 10 | 0 | 7 | 15 |
| اغسطس- ٠٢ | 43.3 | 26.5 | 12 | 0 | 13 | 20 |
| سبتمبر- ٠٢ | 41.3 | 23.6 | 15 | 0 | 22 | 35 |
| اكتوبر- ٠٢ | 36.9 | 19.2 | 19 | 0 | 99 | 63 |
| نوفمبر- ٠٢ | 27.7 | 13.3 | 44 | 4.6 | 700 | 112 |
| ديسمبر- ٠٢ | 21.8 | 10.1 | 58 | 14 | 494 | 54 |
| يناير- ٠٣ | 21.3 | 6.9 | 46 | 2.1 | 59 | 16 |
| فبراير- ٠٣ | 25.4 | 11.8 | 39 | 2.9 | 55 | 39 |
| مارس- ٠٣ | 28.8 | 13.9 | 30 | 6.4 | 495 | 130 |
| ابريل- ٠٣ | 35.2 | 19.7 | 28 | 12.2 | 542 | 109 |
| مايو- ٠٣ | 40.3 | 25 | 17 | 1 | 198 | 35 |
| يونيو- ٠٣ | 43.9 | 26.8 | 11 | 0 | 24 | 12 |

*C.albicep*s *total monthly catch* * = total No. of *C. albiceps* in all sites in a month.
*W. nuba total monthly catch* * = total No. of *W. nuba* in all sites in a month.

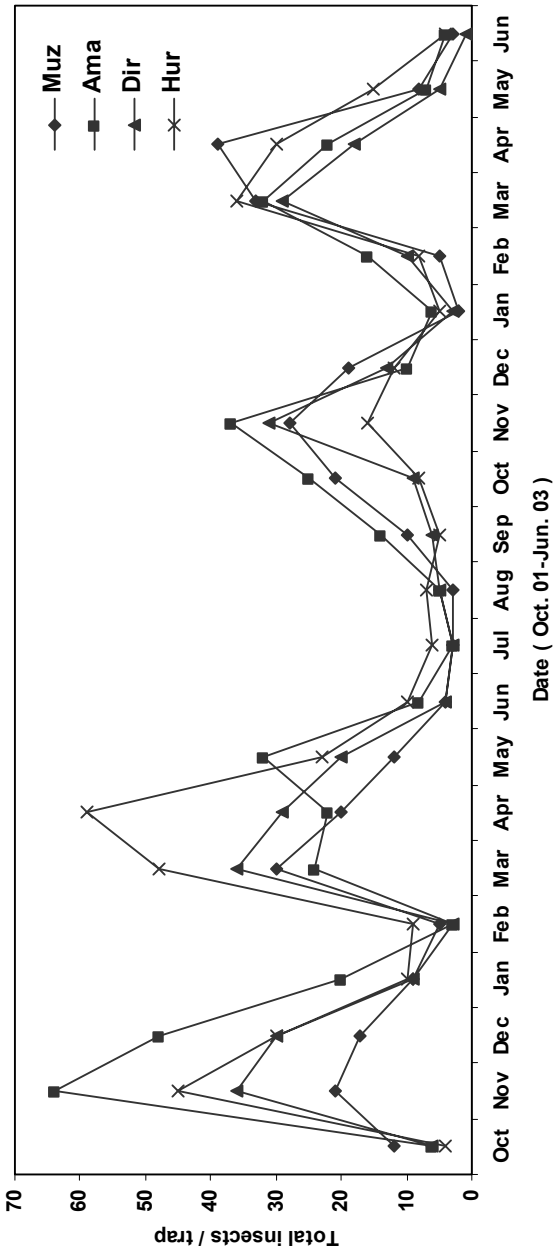


**Fig. 1. Seasonal abundance of *C. albiceps* captured in Swormlure-4 sticky traps in Riyadh Region, Saudi Arabia.**

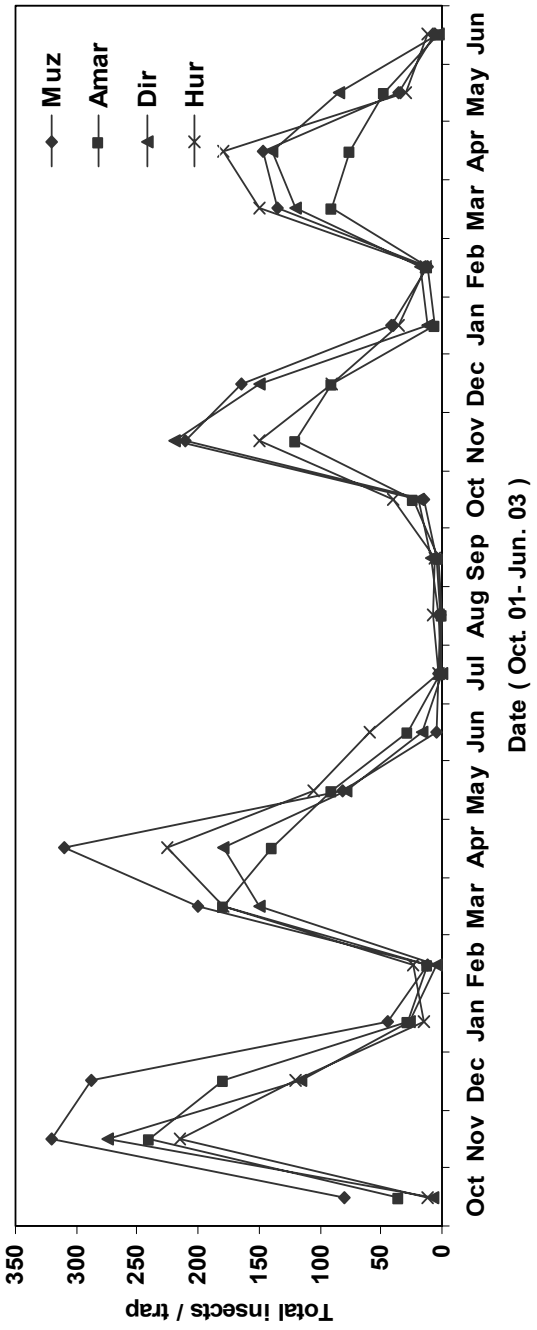


Fig. 2. Seasonal abundance of *W. nuba* captured in Swormlure-4 sticky traps in Riyadh Region, Saudi Arabia.

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# النشاط الموسمي للذباب المسبب للتدويد في الحيوانات باستخدام المصائد اللاصقة المحتوية علي سواملور – ٤ بمنطقة الرياض بالمملكة العربية السعودية

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**الملخص :**

تمت دراسة النشاط الموسمي للذباب المسبب للتدويد في الحيوانات باستخدام مصائد لاصقة بها طعم سواملور- ٤ في أربعة مواقع بمنطقة الرياض هي : المزاحمية- الدرعية- حريملاء و العمارية. تم اصطياد ٣ أنواع من الذباب هي كرايزوميا البيسبس *Chrysomya albiceps*- ولفيرشيا نوبا *Wohlfahrtia nuba* و كرايزوميا بيزيانا *C. bezziana*. وجد في كل المواقع أن كرايزوميا البيسبس هي أكثر عددا من ولفيرشيا نوبا(الفرق معنوي) و كانت ولفيرشيا نوبا أكثر عددا من كرايزوميا بيزيانا(الفرق معنوي) و التي تم اصطيادها بأعداد قليلة جدا. وجد أيضا أن نسبة أعداد ولفيرشيا نوبا إلي أعداد كرايزوميا البيسبس في المزاحمية - الدرعية - حريملاء و العمارية هي ١ :٧، ١ :٥,٣، ١ :٤,٣، ١ :٣,٥ على التوالي. وضح من الدراسة أن هناك ذروتين للنشاط الموسمي لذبابتي كرايزوميا البيسبس و ولفيرشيا نوبا المسببتان للتدويد في شهري أبريل و نوفمبر و أن الظروف المناخية ووجود العائل ربما يؤثران على توزيع و نشاط الذباب المسبب للتدويد في الحيوانات في هذه المواقع.

تدل هذه الدراسة أن للذباب المسبب للتدويد في الحيوانات بمنطقة الرياض أهمية اقتصادية كبرى و يجب وضع خطط و برامج مكافحة متكاملة للحد من انتشاره و ذلك بالاهتمام بالنظافة العامة و استخدام المبيدات عند الضرورة و علاج الحيوانات المصابة.