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Influence of Limited or Completed Food Ingredients Shortage on the Longevity of Mediterranean Fruit Fly, Ceratitits capitata Wiedemann (Diptera: Tephritidae)

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Abstract One of the greatest harmful fruit pests is the Mediterranean fruit fly Ceratitis capitata (Wiedemann) (Diptera: Tephritidae). To study the feeding habits and how long the Mediterranean fruit fly, C. capitata can withstand the deficiency of a few food ingredients (water - sugar - protein), three laboratory experiments were executed. The first test; continuous feeding (through the live adults). The second test; 24 hours feeding for just emerged flies. The third test; 24 hours feeding for 24 hours - age flies. Each experiment consisted of the following formulations: Protein, sugar, water, sugar plus water, water plus protein, 10% sugar solution, and 5% buminal protein solution. Also, two control diet regimes were included in which they were total starvation and a typical adult fly meal of water and a mixture of (4 sugar: 1 protein). According to the findings, sugar was the most important dietary component, and its absence resulted in a clearly shorter fly life span across the three feeding groups. In contrast to sugar-free formulations (75.2 hrs.), which come in second place in terms of adult life span, water-based formulations (either alone (80 hrs.) or combined with protein (140.8 hours) or sugar (240 hours) or protein (alone (64.6 hours), in mixture with other components, or even as a 10% solution (240 hrs.)) all contributed to the adult fly's superior longevity. Also, flies can exist starved in for three successive days without any sort of food. Overall, removing any sort of food from the area under interest, specially, materials that contains sugar or any sort of carbohydrates such as fruit residues, fallen ripen fruits as well as controlling honeydew producing insects is recommended to control the fruit fly. .

Keyword: Mediterranean fruit fly, Food components deficiency, control, starvation, feeding habits.

1. Introduction

In agroecosystems where fruit is grown, the Mediterranean fruit fly, *Ceratitis capitata* (Wiedemann) (Diptera: Tephritidae), is globally widespread and polyphagous pest (Wang *et. al.*, 2018; Alanazi 2022; Dhaouadi *et. al.*, 2023). One of the most harmful and invasive fruit and vegetable pest insects, this pest causes infestations (or threats of infestations) that place a financial burden on farmers all over the world (Liquid *et. al.*, 1998; Zucchi 2001; Chueca *et. al.*, 2007). However, managing fruit flies is difficult since both caterpillars and cocoons in fruits and soils were shielded from external-used fly spray when third-instar larvae drop to pupate in the soil after leaving fruits (Heve *et. al.*, 2016, Dhaouadi *et. al.*, 2023). Additionally, several nations are removing the most efficient broad-spectrum and systemic insecticides from the market, making it harder to control fruit flies there (Böckmann *et al.*, 2014). Sterile males mass-produced for the Sterile Insect Technique (SIT) are released into the field to attract, court, and mate with wild females. It is acting environmentally benign, and worldwide control organizations increasingly view it as the cornerstone of the integrated pest management strategy for the medfly (Hendrichs *et al*., 1995, 2002). This method, which has been demonstrated to be effective against a variety of pests, particularly the medfly, is thought of as an manufacturing procedure that may be developed and progressed upon (Robinson *et al.*, 2002). A lack of an organism's nutritional needs can occasionally restrict or stop its reproductive efforts, focusing its energy instead toward maintaining its somatic health and surviving until conditions are better and breeding can restart (Weithoff, 2007; Carey *et. al*., 2008). Yang *et. al*., (2015) and Root *et. al*., (2011) used the hyperactivity resulted from starvation and the stimulating odor to find food to measure the flies' activity of food searching. In this circumstance, Dus *et. al*., (2011) and Stafford *et. al*., (2012) found that fruit flies can detect the sugars nutritional value with the possibility of using a special mechanism (other than the perception of the peripheral gustatory) to change food preference. Fujita and Tanimura (2011) mentioned that there are two types of carbohydrate sources available in the diets of the fruit fly, D – glucose and its enantiomer L – glucose. The major source for fruit flies' carbohydrates is the D-glucose (Reed *et al.*, 2010), while L-glucose provides no nutritive value since the flies cannot metabolize it. Using the VIENNA 4/Tol-94 genetic arousing breed (Robinson et al., 1999), Kaspi and Yuval (2000) discovered that sterile males fed a protein diet were more likely to join leks and release pheromones than those fed solely a sugar diet. In addition, Male sterile animals fed either sugar or sugar combined with protein as a natural food source in the form of an apple slice did not survive any differently (Pascacio *et. al.*, 2020**)**. A negative effect resulted when these males were starved. In another side, they considerably passed away more quickly when fed protein as opposed to sugar. Maor *et. al*., (2004) found that after two days without food, the majority of fly males (both protein-fed and protein-deprived males) perished. The longevity of flies was significantly influenced by post-teneral feeding. Carey *et. al.*, (2002) reported that protein diet increase male sexual activity, also affects male metabolism, since disruption of protein consuming has remarkable adverse results than does disruption of a protein-deprived diet. Shelly and Kennelly (2002) noticed that copulation activity of wild males fed on protein is much better than sterile who mass reared males. The goal of the current study was to determine how long the Mediterranean fruit fly, *C. capitata*, could survive without some dietary components (water, sugar, and protein), as well as its feeding patterns, in order to develop an effective eco-friendly management strategy for this dangerous pest.

2. Materials and Methods

Insect Cultures:

The Mediterranean fruit fly adults were obtained from the existing cultures and were maintained at 25±2 °C, 70 10% RH, and 12:12h (L:D) daylength in the Laboratory of Entomology, Department of Biology, University of Ha'il, Saudi Arabia. The lab strain of the Mediterranean fruit fly was fed an artificial larval diet that included using sugar as a carbohydrate source and dry sterile yeast as a origin of protein. The mature flies typically consume hydrolyzed protein, sugar, and water (4:1), as well as wheat bran (used as a bulking agent), sodium benzoate, and water.

Cages:

A 100 mL transparent plastic cub that is used as a single fly cage. It is

perforated at the base so that plastic blanks containing food can be fixed there, and it is fixed with a portion of filament mesh on the lid's top, so that flies can get air and water. Ten replicates of each treatment are used. As pupae, the insects were arranged separately.

According to the test's requirements, the newly emerging adult flies were divided one by one into the nutrient-supported cubs. To keep track of the data, a label is put to the cub.

Experiments:

Three experiments were done for these tests:

1. Constant feeding (from birth to death)
2. Eating for the first 24 hours following the emergence of an adult .
3. Feeding over the next two days following the emergence of the adult.

The following diet plans were used in each experiment (FAO, 2019; Abdel-Hafeez, 2019):

- Sugar-fed flies (S): The cubs are maintained by white sugar in the form of granules.
- Protein-fed flies (P): dried protein hydrolyzate is used to sustain the cubs.
- Water-fed flies (W): the cubs are maintained by a wet piece of synthetic sponge that is 2 x 2 x 1 cm in size.
- Sugar and water (S/W): The cubs are supported by a moist artificial sponge made of granulated white sugar and water.
- Sugar + protein fed flies (S/P): the cubs are maintained by dried protein hydrolyzate and granulated white sugar.
- Water + protein fed flies (W/P): the cubs are held aloft by a moist artificial sponge and dry protein hydrolyzate.
- Artificial sponge soaked in 10% sugar solution and used to feed flies (S/Sol).
- Protein solution feeding flies (P/Sol): 5% buminal solution saturated artificial sponge.
- Starved (**Starve**): no dietary components were included.
- Control (**Control**): a whole meal made up of liquid, sweetener, and protein (4:1).

Data collection:

Data was only intermittently recorded every 4 hours for 10 days. Only life lengths of 10 days (240 hours) were recorded, while the control treatment and some other treatments reported life spans that were longer than the test period (10 days). However, To determine how long a fly may survive under various feeding circumstances, the dates of emergence, the start of feeding, the end of feeding, and the date of death were used (Parker *et al*., 2021).

Hint: Only a 10-day (240-hour) life span was noted; the control and some treatments recorded life spans that were longer than the test period (10 days).

Statistical analysis:

One-way ANOVA test was used to evaluate data on life span computed from emergence time until death by hours (roughly) using IBM SPSS statistics version 23. The Least Significance Difference (LSD) was used to identify differences in treatment means where significant differences were found.

3. Results and Discussion

A. Continuous feeding

A.1. Sugar – dependent diet regime

Results in Table (1), show that there are no significant differences in the fly longevity among control, sugar solution, water - sugar and sugar- protein flies with 240 hrs. for each treatment. However, they are significantly differing where flies found feed on sugar fed flies (178.8 hrs.) compared to starved flies with the least fly longevity.

Table (1): Means and standard errors (S.E) of the fly longevity under sugar dependent continuous regime treatments including C: Control, S: Sugar, S sol: Sugar solution (10%), S / W: Sugar and water, S / P:Sugar + protein and Starv.: Starved flies.

	Diet regime	Mean ± S. E (hrs.)
1	C	240 ± 0.0 a
2	S	178.8 ± 1.068 b
3	S sol	240 ± 0.0 a
4	S / W	240 ± 0.0 a
5	S / p	240 ± 0.0 a
6	Starv	75.2 ± 0.663 c

By using the LSD test, implies there is no difference between values in each column that are followed by the same small letter (P > 0.05).

A.2. Protein – dependent diet regimes

Data revealed that control and sugar – protein fed With a typical lifespan of 240 hours, flies are not very different from one another, although they are significantly different from the rest of the cases those differ significantly from each other, in the second rank, flies fed on protein - water with mean longevity of 140.8 followed by protein solution diet (84.8hr), starved flied (75.2) and the protein fed flies came with the least mean longevity of 64.6 hrs. (Table 2).

Table (2): Means and standard errors (S.E) of the fly longevity under protein dependent continuous regime treatments including C: Control, P sol: Protein solution (10%), P: dried protein, P / W: Water + protein, P / S: Sugar + protein and Starv.: Starved flies.

	Diet regime	Mean ± S. E (hrs.)
1	C	240 ± 0.0 a
2	P sol	84.8 ± 0.663 c
3	P	64.6 ± 0.51 e
4	P / W	140.8 ± 0.86 b
5	P / S	240 ± 0.0 a
6	Starv	75.2 ± 0.663 d

By using the LSD test, implies there is no difference between values in each column that are followed by the same small letter (P > 0.05).

A.3. Water– dependent diet regimes

Data presented in Table (3), show that the control fed flies, sugar - water and sugar solution fed flies did not show significant differences among them and highest longevity periods of 240 hrs. However, there a significant difference between them and other groups in which the protein - water regime came the second-best regime with mean longevity of 140.8 hrs., followed by protein solution fed flies (84.4), water fed flies (80 hrs.) and finally starved flies with the least longevity mean of 80 hrs.

Table (3): Means and standard errors (S.E) of the fly longevity under water dependent continuous regime treatments including C: Control, W: water, S sol:

	Diet regime	Mean ± S. E (hrs.)
1	C	240 ± 0.0 a
2	W	80 ± 0.55 d
3	S sol	240 ± 0.0 a
4	P sol	84.8 ± 0.663 c
5	W / S	240 ± 0.0 a
6	W / p	140.8 ± 0.86 b
7	Starv	75.2 ± 0.663 e

By using the LSD test, implies there is no difference between values in each column that are followed by the same small letter (P > 0.05).

•Sugar solution (10%), P sol: Protein solution (10%), W / S: Sugar and water, P / W: Water + protein and Starv.: Starved flies.

B - 24 hours feeding

B.1. Sugar – dependent diet regimes

With a mean longevity of 240 hours, The results of Table (4) demonstrated that the difference between the flies fed sugar solution and the controls could not be seen. for each. Conversely, they significantly differ from other regime diets. The rest of the groups differ significantly from each other, sugar – water fed flies came in the second order followed by a sugar-protein diet with a mean lifespan of 183.4 hours and a mean of 171.8 hours, then sugar fed flies (150hrs.) and finally, starved flies with mean longevity of 75.2 hrs.

Table (4): Means and standard errors (S.E) of the fly longevity under sugar – dependent diet regime treatments for 24 hours feeding including C: Control, W: water, S: Sugar, S sol: Sugar solution (10%), S / W: Sugar and water, S / P: Sugar + protein and Starv.: Starved flies.

	Diet regime	Mean ± S. E (hrs.)
1	C	240 ± 0.0 a
2	S	150 ±1.0 d
3	S sol	240 ± 0.0 a
4	S / W	183.4 ± 1.51 b
5	S / P	171.8 ± 1.3 c
6	Starv	75.2 ± 1.48 e

By using the LSD test, implies there is no difference between values in each column that are followed by the same small letter ($P > 0.05$).

B.2. Protein – dependent diet regimes

Results from Table (5) made it evident, all groups differ significantly from each other, Control fed flies have a longer lifespan (240 hours), followed by sugar protein diet (171.8 hrs.), then, flies fed on water and protein had a mean lifespan of 151.2 hours., starved flies (75.2 hrs.), protein solution fed flies (70.8 hrs.) and finally with the minor longevity period of 61.2 hrs.

Table (5): Means and standard errors (S.E) of the fly longevity under protein – dependent diet regime treatments for 24 hours feeding including C: Control, W: water, P sol: Protein solution (10%), P: dried protein, P / W: Water + protein, S / P: Sugar + protein and Starv.: Starved flies.

	Diet regime	Mean ± S. E (hrs.)
1	C	240 ± 0.0 a
2	P sol	70.8 ± 0.84 e
3	P	61.2 ± 0.84 f
4	P / W	151.2 ± 1.3 c
5	P / S	171.8 ± 1.3 b
6	Starv	75.2 ± 1.48 d

By using the LSD test, implies there is no difference between values in each column that are followed by the same small letter ($P > 0.05$).

B.3. Water– dependent diet regimes

Results in Table (6) showed that, the maximum lifetime, with averages of 240 hours, was not significantly different between control fed flies and sugar solution fed flies, for both. While they differ significantly from rest of the regimes those differ significantly from each other, sugar – water fed flies secondly (183.4 hrs.), then, water - protein fed flies who's come as the third rank with mean of 151.2 hrs. and then, water-fed flies had a mean lifespan of 86 hours, followed by diet-starved flies (75.2 hours) and the least longevity for protein solution with 70.8 hrs.

Table (6): Means and standard errors (S.E) of the fly longevity under water dependent continuous regime treatments for 24 hours feeding including C: Control, W: water, S sol: Sugar solution (10%), P sol: Protein solution (10%), W / S: Sugar and water, P / W: Water + protein and Starv.: Starved flies.

	Diet regime	Mean ± S. E (hrs.)
1	C	240 ± 0.0 a
2	W	86 ± 1.0 d
3	S Sol	240 ± 0.0 a
4	P Sol	70.8 ± 0.84 e
5	W / S	183.4 ± 1.51 b
6	W / P	151.2 ± 1.3 c
7	Starv	75.2 ± 1.48 f

By using the LSD test, implies there is no difference between values in each column that are followed by the same small letter (P > 0.05).

C - 24 hours of continuous feeding aged flies

C.1. Sugar – dependent diet regimes

Table (7)'s findings showed that, all groups differ significantly from each other, control feeding flies came the superior longevity with a mean of 240 hours and sugar solution diet (156 hours), respectively, then, sugar – water fed flies (121 hrs.) followed by sugar – protein regime with mean longevity of 116 hrs., then, sugar fed flies with 106.4 hrs. and finally starved flies as the minor longevity of 75.2 hrs.

Table (7): Means and standard errors (S.E) of the fly longevity under Sugar – dependent diet regime treatments for 24 hours feeding of 24 hours aged flies including C: Control, S: Sugar, S sol: Sugar solution (10%), S / W: Sugar and water, S / P: Sugar + protein and Starv.: Starved flies.

	Diet regime	Mean ± S. E (hrs.)
1	C	240 ± 0.0 a
2	S	106.4 ± 0.4 e
3	S sol	156 ± 0.71 b
4	S / W	121 ± 0.32 c
5	S / P	116 ± 0.37 d
6	Starv	75.2 ± 0.66 f

By using the LSD test, implies there is no difference between values in each column that are followed by the same small letter (P > 0.05).

C.2. Diet plans that rely heavily on protein

Data presented in Table (8) revealed that control feeding flies differ significantly from the other cases with a mean longevity of 240 hours, followed by flies fed on sugar and protein with a mean survival period of 116.2 hours, and differ significantly with both flies that have been fed protein and protein - water fed flies with an average lifespan of 85.8 hours for both. They also differ significantly from food-deprived flies whose mean longevity is 240 hours. This also significantly differs from protein solutions fed flies which are the least longevity period of 71.8 hrs.

Table (8): Means and standard errors (S.E) of the fly longevity under Protein – dependent diet regime treatments for 24 hours feeding of 24 hours aged flies including C: Control, P sol: Protein solution (10%), P: dried protein, P / W: Water + protein, S / P: Sugar + protein and Starv.: Starved flies.

	Diet regime	Mean ± S. E (hrs.)
1	C	240 ± 0.0 a
2	P sol	71.8 ± 0.58 e
3	P	85.8 ± 0.37 c
4	P / W	85.8 ± 0.37 c
5	P / S	116.2 ± 0.37 b
6	Starv.	75.2 ± 0.66 d

By using the LSD test, implies there is no difference between values in each column that are followed by the same small letter (P > 0.05).

C.3. Water– dependent diet regimes

Table (9), which shows how significantly all groups differ from one another, shows that control feeding flies had the longest lifespan on average (240 hours), followed by flies given sugar solution (156 hours), and flies given sugar and water (121 hours), water fed flies (88 hrs.), water – protein diet (85.8 hrs.), starved flies (75.2 hrs.), and finally, protein solution fed flies came with the least longevity mean of 71.8 hrs.

Table (9): Means and standard errors (S.E) of the fly longevity under water dependent continuous regime treatments for 24 hours of 24 hours aged flies feeding including C: Control, W: water, S sol: Sugar solution (10%), P sol: Protein solution (10%), W / S: Sugar and water, P / W: Water + protein and Starv.: Starved flies.

	Diet regime	Mean ± S. E (hrs.)
1	C	240 ± 0.0 a
2	W	88 ± 0.32 d
3	S Sol	156 ±0.71 b
4	P Sol	71.8 ± 0.58 g
5	W / S	121 ± 0.32 c
6	W / P	85.8 ± 0.37 e
7	Starv	75.2 ± 0.66 f

By using the LSD test, implies there is no difference between values in each column that are followed by the same small letter ($P > 0.05$).

Numerous studies on nutritional benefits of different arthropod life stages have concentrated on how they affect fitness factors as body mass, fertility, egg dimensions, and lifespan (Aluja *et al.*, 2009; Bauerfeind and Fischer, 2009; Kleinteich *et al.*, 2015). The current investigation looked into the Mediterranean fruit fly, *C. capitata*'s feeding patterns and its tolerance to a lack of certain nutrients. According to the study's findings, sugar was the most important dietary component, and its absence significantly reduced the lifespan of flies, particularly when adults were first fed a sugar-only diet, then as they grew older were switched to a full diet (sugar and yeast). It is known that carbohydrates play an essential role for survival and fecundity of several insects such as Synovigenic parasitoids and various insect adults (Stuhl *et. al.*, 2011). Dus *et. al*., (2011) and Stafford *et. al*., (2012) observed that fruit flies can identify the sugars nutritional value with the possibility of using a special mechanism (other than the perception of the peripheral gustatory) to change food preference. Also, Included sugar and other dietary components, such as protein, are thought to be essential for dietary needs for energy synthesis and development, which have a significant impact on the adult life history features of numerous insects (Bateman 1972; Jácome *et. al.,* 1999; May *et. al.,* 2015). The effect of sugar- protein on the medfly longevity is in agreement with other studies that reported higher adulthood longevity. In the Caribbean fruit fly *Anastrepha suspensa* (Loew), Teal et al. (2004) discovered that flies who ate a diet high in protein and low in sugar lived longer. Wang *et. al.*, (2018) showed that providing sugar and protein led a rise in the adult survival and breeding of the Chinese citrus fruit fly, *Bactrocera minax* (Enderlein) (Diptera: Tephritidae). This may be explained by the fact that sucrose consumption speeds up insect metabolism, and the resulting increase in energy lengthens insect lifespan (Lardies *et. al.,* 2004; Naya *et. al.,* 2007).

Because it provides amino acids required for insect oviposition, protein is a crucial dietary component for insect reproduction (Lardies *et. al.,* 2004).

According to Alamzeb et al. (2006), protein is essential for the development of female oocytes to the vitellogenic stage. According to Harwood et al. (2013), protein-enriched foods increase fruit fly survival and breeding potential in the Mediterranean fruit fly, *C. capitata*, and melon fly, *Bactrocera cucurbitae* Coquillett. This suggests that providing these insects with protein-rich foods increases their likelihood of surviving and reproducing. This is because protein diet increases male sexual activity, also affects male metabolism, since protein feeding disruption has more detrimental effects than stoppage of other types of a protein- deprived diet (Carey *et al.*, 2002). Shelly and Kennelly (2002) noticed that copulation activity of wild males fed on protein is much better than sterile who mass reared males. For many insects, including *Drosophila melanogaster*, the Queensland fruit fly *Bactocera tryoni*, the Tephritid fruit fly *Anastrepha ludens*, and the field cricket *Teleogryllus commodus*, which has been studied in numerous studies, understanding intake of the most important factor in determining lifespan is the ideal carbohydrate to protein ratio, with or without alterations in calorie consumption (Carey *et. al.*, 2008; Lee *et. al.*, 2008; Fanson *et. al.*, 2009). The findings of this study supported the positive impact of sugar on the longevity of the Mediterranean fruit fly, *C. capitata*, showing that longevity improved when medflies were fed a sugar-protein diet with a low ratio of protein.

4. Conclusions

According to the findings, sugar was the most crucial dietary component for the three feeding regimens, and its absence resulted in a clear decrease in fly life span. In comparison to sugar-free formulations, adult fly longevity was found to be increased by the inclusion of sugar in the diet, whether it was present alone, in conjunction much as a 10% solution, or even with water and protein. Water-based formulations either alone or in combination with sugar or protein come in second place in terms of adult life span, while protein can be found on its own, in conjunction with sugar or water, or as a 5% solution has the minimum impact. Also, flies can exists starved in for three successive days without any sort of food, so, it is recommended, in case of control programs, removing any sort of food or any material that could be a sort of food for the flies from the area under interest, specially, materials that contains sugar or any sort of carbohydrates such as fruit residues, fallen ripen fruits, also control honey dew producing insects, to prevent flies from food, so flies either die or migrate to other food rich area.

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تأثير نقص المكونات الغذائية المحدودة أو المكتملة على طول عمر ذبابة فاكهة البحر الأبيض المتوسط، Ceratitits capitata Wiedemann (Diptera: Tephritidae)

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مستخلص. تعتبر ذبابة فاكهة البحر الأبيض المتوسط من أكثر آفات الفاكهة ضررًا. ولدراسة عادات التغذية على بقاء ذبابة فاكهة البحر الأبيض المتوسط عند نقص بعض مكونات الغذاء (ماء – سكر – بروتين)، تم إجراء ثلاثة اختبارات معملية. الاختبار الأول التغذية المستمرة (من خلال البالغين الأحياء). الاختبار الثاني، إطعام الذباب الذي ظهر للتو على مدار ٢٤ ساعة. الاختبار الثالث إطعام ٢٤ ساعة لمدة لعمر الذباب– ٢٤ ساعة. يتكون كل اختبار من التركيبات التالية: سكر ، بروتين ، ماء ، سكر مضاف إليه ماء ، سكر + بروتين ، ماء + بروتين ، محلول سكر (١٠٪) ومحلول بروتين (٥٪ بومينال) ؛ بالإضافة إلى نظامين للمعاملة الضابطة ، التجويع الكامل ووجبة الذباب العادية المكونة من الماء و (٤ سكر : ١ خليط بروتين). أوضحت النتائج أن السكر كان أهم مكونات النظام الغذائي وأدى غيابه إلى انخفاض واضح في عمر الذباب لمجموعات التغذية الثلاث. إن وجود السكر في النظام الغذائي (إما بمفرده (١٧٨,٨ ساعة) أو البروتين (٢٤٠ ساعة) أو حتى كمحلول ١٠٪ (٢٤٠ ساعة)) أعطى الذباب البالغ طول عمر أطول مقارنة بالتركيبات الخالية من السكر (٧٥,٢ ساعة) ، تليها التركيبات القائمة على الماء (إما بمفرده (٨٠ ساعة) أو مع السكر (٢٤٠ ساعة) أو البروتين (١٤٠,٨ ساعة) حيث احتلت الترتيب الثاني فيما يتعلق بعمر البالغين ، والبروتين (بمفرده) (٦٤,٦ ساعة) ، بالاقتران مع المكونات الأخرى أو في شكل محلول ٥٪ (٨٤,٨ ساعة)) هو الأقل أهمية ، كما يمكن أن يبقى الذباب لمدة ثلاثة أيام متتالية جوعاً دون أي نوع من الطعام. لذا يوصى للسيطرة على ذبابة الفاكهة بازالة أي نوع من الأطعمة من المنطقة محل الاهتمام ، خاصة المواد التي تحتوي على السكر أو أي نوع من الكربوهيدرات مثل بقايا الفاكهة والفاكهة الناضجة المتساقطة وكذلك مكافحة الحشرات التي تنتج الندوة العسلية. .

الكلمات الدالة: ذبابة فاكهة البحر الأبيض المتوسط ، نقص المكونات الغذائية ، المكافحة ، التجويع ، عادات التغذية.