Since 1996

A New Design for Feeding the Predatory Mite, *Amblyseius Swirskii* Athias-Henriot (Acari: Phytoseiidae), on A Liquid Artificial Diet

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ABSTRACT: Six designs were tried out to evaluate the efficiency of each regarding feeding the predatory mite, *Amblyseius swirskii* Athias-Henriot (Acari: Phytoseiidae), on a liquid artificial diet, considering four criteria: the duration of the liquid-phase of the diet, the percentage of the mites that congregate to feed on the diet, the percentage of the mites that adhere to the diet, and the duration of sucking the diet up.

The most efficient design was based on providing the mites with a diet-saturated piece of thread connected to a little of the diet. For this, the piece of thread was passed through a 10 ml plastic pot containing a little of the diet. As soon as the piece of thread turns solid, it is pulled to be replaced with the next diet-saturated piece.

By applying that design to feed the mites on a diet composed of skim milk, honey, yolk, baker's yeast, and amino acid solution 10% at a volume ratio of 100:1:1:20:1, respectively, the diet that saturated the piece of thread remained in the liquid phase for an average of three hours; then, it turned solid. The ability of the diet located in the pot, to saturate more thread, lasted for five hours; then, it coagulated. The percentage of the mites that congregated to feed on the diet, in 30 minutes, amounted to an average of 83.33%. No individual stuck to the diet-saturated thread within the liquid-phase span. Sucking the diet continued for an average of 62.33 minutes.

Keywords: *Amblyseius swirskii*, artificial diet, liquid-phase, stick, thread

INTRODUCTION

Amblyseius swirskii Athias-Henriot (Acari: Phytoseiidae) is a generalist phytoseiid mite. It has been used for biological control since 1962 (**van Lenteren 2012**).

Efficient mass-production methods are required to increase the successful use of biological agents (**Blackburn *et al.* 2016**). The mass rearing of predators can be complicated; most are reared on artificial diets, which often require supplementation with honey or sugar solutions (**Thompson 1999**). Commercial production of *A. swirskii* based on storage mites needs both space and labour to maintain large cultures of the prey, and may lead to health problems for workers. The accessibility of a suitable artificial diet could eliminate the problems mentioned above (**Riahi *et al.* 2017**).

Different artificial diets have been developed for this predator, but using liquid diets complicates mass production of it (**Nguyen *et al.* 2014 a**). **Nguyen *et al.* (2015)** fed phytoseiid mites on a liquid artificial diet. The artificial diet was absorbed on a small piece of filter paper, but some mites died due to unnatural causes. **Nguyen *et al.* (2014 b)** found that *A. swirskii* had no difficulty handling and feeding on powdered solid artificial diets. **Vangansbeke *et al.* (2014)** used dry decapsulated cysts of the brine shrimp, *Artemia franciscana* (Branchiopoda: Artemiidae) as food supplementation to feed the predatory mite, *Amblydromalus limonicus* (Acari: Phytoseiidae). **San *et al.* (2020)** evaluated the suitability of brown sugar for *Carpoglyphus lactis* (L.), which was used for rearing *A. swirskii*. They found that brown sugar resulted in low numbers of predator and prey mites. They attributed that to the relative moisture content and adhesiveness of the brown sugar medium, which inhibited mite movement.

Due to their adhesive nature, semi-liquid diets based on fresh pork liver homogenate generally cause high mortality of young larvae of the predator *Harmonia axyridis* (**Zhang *et al.*, 2008**). **Sun *et al.* (2018)** observed that after almost one day of exposing the semi-liquid diet to air, a membranous layer was formed on the outside surface of the diet and it looked hard to feed on. To improve the physical properties of that artificial diet, they used the fine powder to develop a mushy diet to replace the semi-liquid diet. They found that the infant larvae had a higher survival rate on a mushy diet than on a semi-liquid diet.

Methods of mass production of biological control agents must be optimized individually (**Thompson 1999**).

Given the foregoing, feeding predaceous mites, such as *A. swerskii*, on a liquid artificial diet is often encountered with three obstacles: First, some mite individuals stick to the diet and die. Second, the diet surface stiffens quickly and becomes unsuitable for feeding. Third, there is difficulty getting rid of the stale diet without injuring or losing some individuals. Therefore, the present study was adopted to overcome the above-mentioned obstacles and to facilitate the rearing of that mite for study or for commercial purposes.

MATERIALS AND METHODS

Preparing the main part of all the feeding designs

As shown in **Fig. 1**, the main part of all the feeding designs was represented by a 13-cm-diameter round plastic dish comprising a circular groove along its margin. To prevent the mites from escaping, the method created by **Elshazly (2022 a)** was applied. Hereupon, phosphoric acid (3%) was placed in the groove. Moreover, the mites were confined to the central area of the dish (10 cm in diameter), which was surrounded by a five-millimeter-high wall. A 0.5-millimeter-diameter cotton thread was laid on the outer bevel of the wall top. To ensure continuous saturation of the thread, one of its tips was immersed in the groove liquid. The wall was erected by using a hot melt glue stick and a compatible electric gun

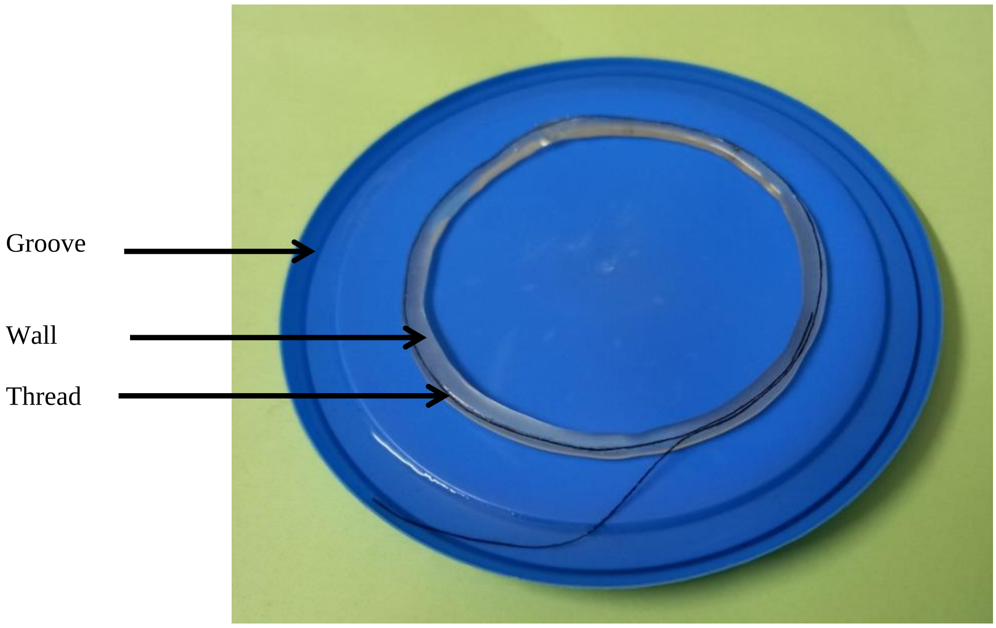

Fig. 1. The main part of all the feeding designs

Implementation of the feeding designs

Six feeding designs were tried out. The basis of each design was connected with the method of presenting the diet to the mites. The bases of the feeding designs were as follows:

1. Placing a diet drop directly on the dish

No modifications were made to that design. The surface of the dish was the place to put the diet drop.

2. Placing a diet drop between two glass slides

As shown in **Fig. 2**, a microscopic slide was laid on the dish. When a diet drop is placed on the microscope slide and covered with a microscopic coverslip (1.8 cm × 1.8 cm), it spreads between them. The distance between the slide and the coverslip has to be minute.

Fig. 2. The design based on placing the diet between two glass slides

3. Presenting a diet drop via a thread connected to a little of the diet

As shown in **Fig. 3**, a 20-ml plastic pot was utilized to place the diet stock in. The outer side of the pot was stuck to the dish margin. A 2.5-cm-long tube (3 mm in diameter) was stuck to the dish surface; it penetrated the pot side. On the same straight line as the tube, a similar tube was stuck to the dish surface, leaving a space of eight cm between the two tubes. A hole was made in the side of the pot opposite the tube opening but at a higher level. A 0.5-mm-diameter cotton thread was inserted into the hole and passed straightly through the two tubes. The opposite tips of the two tubes were tightened. A plastic bar was fastened inside the pot to keep the thread near the pot bottom for continuous saturation. The rest of the spool from which the thread was pulled out was kept beside the pot so that the used pieces of the thread could be replaced continually by pulling. The thread located between the two tubes was allocated for mite feeding.

Fig. 3. The design based on presenting a drop of the diet via a thread connected to a little of the diet

4. Placing a diet drop in a tiny plastic pot

As shown in **Fig. 4**, a plastic pot with a capacity of 0.04 ml was put on the dish to place the diet drop in.

Fig. 4. The design based on placing a drop of the diet in a tiny plastic pot

5. Placing the dish on which a drop of the diet is located, in a tray containing a little water

As shown in **Fig. 5**, the dish allocated to that design was placed in a tray containing a little water. The water level was below the dish surface. The tray was tightly covered with a glass lid.

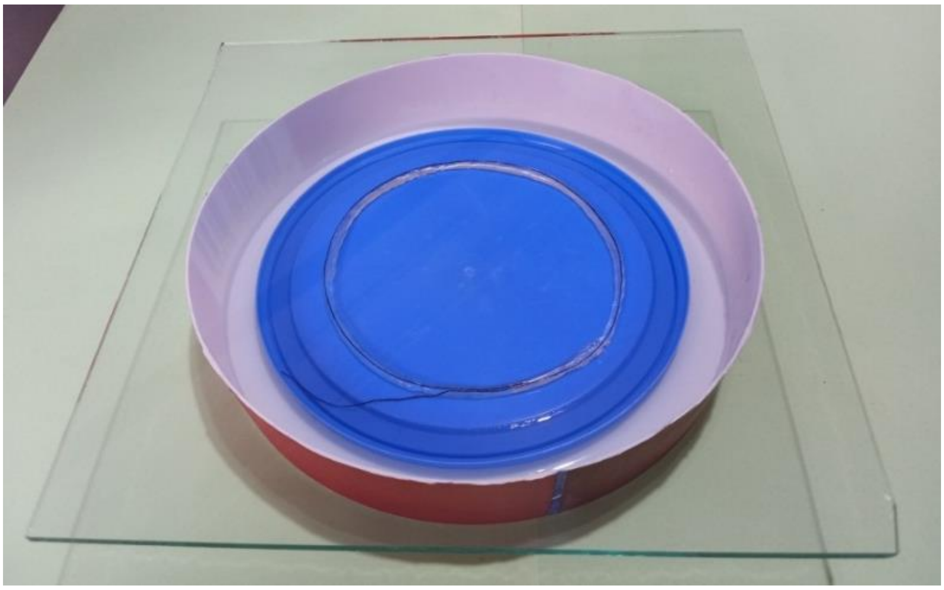

Fig. 5. The design based on placing the dish on which a drop of the diet is located, in a tray containing a little water

6. Placing a diet drop on a piece of cloth connected to a water-saturated thread

As shown in **Fig. 6**, a piece of cloth (1 cm × 0.7 cm) was laid on the dish; it was the site to put the diet drop on. A 10-cm-long thread was utilized to supply the cloth piece continuously with water. A four-ml vial of water was placed in the dish. One of the thread tips (1 cm long) was laid on the cloth; meanwhile, the other tip was immersed in the water existing in an adjacent vial. The lid hole across which the thread passed was rather loose.

Fig. 6. The design based on placing a drop of the diet on a piece of cloth connected to a water-saturated thread

Replicates

For each feeding design, ten replicates were set up, without taking into consideration the escape-preventing measures, to define the duration of the liquid-phase of the diet. Most of the ten replicates were damaged due to the reduction in the diet amount resulting from examining them. Therefore, only three replicates were considered to determine the duration of the liquid-phase of the diet. It's worth stating that no mites were placed on the dishes allocated for that purpose.

Moreover, for each feeding design, three other replicates were set up, taking into consideration the escape-preventing measures, to determine the numbers of the mites that would stick to the diet.

Obtaining the mite individuals

Individuals of *A. swirskii* were collected from cotton plant leaves by using a fine brush. For successful pickup, the brush hair was sodden so that the mites could be attached to it easily. The mites were starved for 24 hours before being placed in the dishes. Fifty mite individuals were placed in the dish of each replicate. During the study, individuals of *A. swirskii* were counted considering the taxonomic identification.

Preparing the diet

A diet composed of skim milk, honey, yolk, baker's yeast, and an amino acid solution of 10% at a volume ratio of 100:1:1:20:1, respectively, was prepared immediately before introducing it to the mites. According to **Elshazly (2022 b)**, the diet used for this study was found to be the most appealing to *A. swirskii* when compared with other diet combinations.

Providing the mites with a liquid diet

A diet drop of 0.04 ml was presented to the mites of each replicate. The diet was presented to the mites at night, when most mites move actively. **Abd El-Tawab *et al.* (1982)** found that predation by *A. swirskii* was greater under complete darkness or a short photo-phase (8 h). Diet drops were placed in the appropriate locations for each design. As regards the design based on presenting a diet drop via a thread connected to a little of the diet, two ml of the diet were placed in the pot; meanwhile, the thread got saturated by pulling it. It is worth stating that, in a separate assessment, the diet quantity sufficient for saturating an 8-cm-long thread was found to be 0.04 ml, which is equal to the same diet quantity used for each of the other designs. When the feeding-allocated piece of thread dried and turned solid, the thread was pulled to be replaced with the next saturated piece of thread.

Estimating the duration of the liquid-phase

Since the wet layer of the diet surface is the mite-feeding location, the duration of the liquid-phase of that layer was estimated. The average duration of the liquid-phase was calculated for each design. The values concerning all the designs were arranged in ascending order. Notably, the shiny appearance of the diet surface indicated the liquid phase. The liquid phase was distinguished by touching the diet surface with a brush or a piece of a handkerchief, which absorbs the liquid and turns wet. Rationally, the brush and/or the handkerchief tissue absorb a portion of the diet they touch, which is considered a change in the experiment provisions. That is why ten replicates were set up for that evaluation, despite needing only three.

As regards the design based on presenting a diet drop via a thread connected to a little of the diet, the duration of the ability of the diet located in the pot to saturate more thread was estimated as well.

Estimating the percentages of the mites that congregate to feed on the diet

The numbers of the congregating mites, in 10, 20, and 30 min to feed on the diet were recorded and the percentage of each category was calculated. For each design, the average percentage of the feeding mites was calculated. The estimated values concerning all the experimental designs were arranged in ascending order.

Estimating the percentages of the mites that adhere to the diet

For each replicate, the mites that stuck to the diet within the first 10, 20, and 30 minutes of the liquid-phase span were counted and the percentage of each category was calculated. For each design, the average percentage of the stuck mites was calculated. The values concerning all the designs were arranged in ascending order. Likewise, for each design, the average percentage of the mites that stuck to the diets within the whole liquid-phase span was calculated. Exceptionally, for both of the designs based on using a tray and using a vial, the mites that stuck to the diet within the first 24 hours were considered because the liquid-phase span of each of the two designs was long-lasting.

Estimating the duration of sucking the diet up

For each feeding design, three replicates were set up to define the duration of sucking the diet. One mite was placed beside the diet to start sucking. As regards the designs in which the diet surface solidifies quickly, more diet was added until the mites were satiated.

Conditions of the experiments

The experiments were conducted at a temperature of 30 ± 5° C, relative humidity of 70 ± 5%, and a 16:8 hr. (L: D) photoperiod.

Statistical analysis

The data were analyzed using ANOVA, with three replicates for each treatment. The least significant differences (L.S.D.) at the 0.05 ≤ level were determined according to the computer program CoStat software and Duncan's Multiple Range.

RESULTS

Parameters of the liquid-phase span are shown in **Table 1**. Parameters of the percentages of the mites that congregated to feed on the diet are shown in **Table 2**. Parameters of the percentages of the mites that adhered to the diet are shown in **Table 3**. Parameters of the durations of sucking the diet are shown in **Table 4**. Moreover, there were some remarks on the different designs as follows:

1. Placing a diet drop directly on the dish

The margin of each drop solidified in 15 minutes.

2. Placing a diet drop between two glass slides

Small bubbles appeared between the two slides and increased with time.

3. Presenting a diet drop via a thread connected to a little of the diet

The diet saturating the thread remained in the liquid phase for 3.2 hours. The liquid diet located in the pot had the ability to saturate more of the thread for up to five hours; then, it coagulated. Accordingly, the total possible feeding span attained from the diet located in the pot would last for eight hours. Mites weren't jeopardized while changing the diet-saturated thread.

4. Placing a diet drop in a tiny plastic pot

The level of the diet surface was descending with time. The percentage of the evaporated liquid, until turning to the surface-solidification phase, amounted to 75%.

5. Placing the dish on which a drop of the diet is located, in a tray containing a little water

Over a month, the diet didn't turn solid as long as the humid air was available around it. Dewdrops existed continuously on the inner surface of the tray lid.

6. Placing a diet drop on a piece of cloth connected to a water-saturated thread

Over a month, the diet didn't turn solid as long as the water supply was available.

Table 1: Parameters of the duration of the liquid-phase

Feeding design basis	Average duration, in hours	Rank
Placing a diet drop directly on the dish	1.50 c	2
Placing a diet drop between two glass slides	0.52 d	1
Presenting a diet drop via a thread connected to a little of the diet	3.02 b	3
Placing a diet drop in a tiny plastic pot	5.08 a	4
Placing the dish on which a diet drop is located, in a tray containing a little water	Long lasting	5
Placing a diet drop on a piece of cloth connected to a water-saturated thread	Long lasting	5
L.S.D., 0.05	0.095	

Averages followed by the same letter are not significantly different at the $P < 0.05$ level.
Ranks are arranged in ascending order.

Table 2: Parameters of the percentages of the mites that congregated to feed on the diet

Feeding design basis	In 10 minutes		In 20 minutes		In 30 minutes	
	Average percentage	Rank	Average percentage	Rank	Average percentage	Rank
Placing a drop of the diet directly on the dish	27.33 b	3	44.67 c	3	62.67 b	5
Placing the diet between two glass slides	30.67 b	4	54.00 b	4	2.67 f	1
Presenting the diet via a thread connected with the rest amount of the diet	70.67 a	6	82.00 a	6	83.33 a	6
Placing the diet in a tiny plastic pot	10.00 c	1	9.33 e	1	9.33 e	2
Placing the dish in a tray containing a little water	26.67 b	2	30.67 d	2	22.67 d	3
Placing the diet on a piece of cloth, connected to a water-saturated thread	60.67 a	5	56.00 b	5	36.00 c	4
L.S.D., 0.05	10.64		7.26		4.51	

Averages followed by the same letter in the same column are not significantly different at the $P < 0.05$ level.
Ranks are arranged in ascending order.

Table 3: Parameters of the percentages of the mites that adhered to the diet

Design basis	Within 10 minutes		Within 20 minutes		Within 30 minutes		Within the whole liquid-phase span	
	Average percentage	Rank	Average percentage	Rank	Average percentage	Rank	Average percentage	Rank
Placing a drop of the diet directly on the dish	2.00 a	2	3.33 a	3	10.67 a	5	12.00	4
Placing the diet between two glass slides	0.00 b	1	0.00 c	1	0.00 c	1	0.00	1
Presenting the diet via a thread, which is connected with the rest amount of the diet	0.00 b	1	0.00 c	1	0.00 c	1	0.00	1
Placing the diet in a tiny plastic pot	0.00 b	1	0.67 c	2	0.67 c	2	4.00	3
Placing the dish in a tray containing a little water	3.33 a	3	5.33 a	4	8.00 b	4	21.33 * W. F. D.	5
Placing the diet on a piece of cloth, which is connected to a water-saturated thread	0.00 b	1	0.67 c	2	1.33 c	3	3.33 * W. F. D.	2
L.S.D., 0.05	1.67		1.67		2.05		-	

Averages followed by the same letter in the same column are not significantly different at the $P < 0.05$ level.
Ranks are arranged in ascending order.
* W. F. D.: within the first day

Table 4: Parameters of the durations of sucking the diet

Design basis	Average duration, in minutes	Rank
Placing a drop of the diet directly on the dish	60.67 a	5
Placing the diet between two glass slides	31.67 c	1
Presenting the diet via a thread, which is connected with the rest amount of the diet	62.33 a	6
Placing the diet in a tiny plastic pot	57.67 a	4
Placing the dish in a tray containing a little water	41.33 b	3
Placing the diet on a piece of cloth, which is connected to a water-saturated thread	34.33 bc	2
L.S.D., 0.05	8.84	

Averages followed by the same letter are not significantly different at the $P < 0.05$ level.
Ranks are arranged in ascending order.

DISCUSSION

1. Placing a diet drop directly on the dish

The liquid-phase span was comparatively short (1.5 hours). after touching the diet.

2. Placing a diet drop between two glass slides

The idea of creating that design consisted in covering the drop of the liquid diet with a thin slide to reduce the area of the diet surface exposed to solidification agents such as aridity. Thereupon, a drop of the liquid diet was trapped between the upper and lower slides. The distance between the two slides was minute. However, the aired surface of the diet, which existed at the margins of the upper slide, solidified quickly. On the other hand, the area of the diet surface to which the mites are exposed was reduced, aiming to reduce the number of mites which are prone to sticking to the diet. Consequently, no mites adhered to it. As for the bubbles that appeared between the two slides, they may refer to the yeast-produced CO_2. Jerry et al. (2017) noticed the CO_2 generated from different yeast/sugar mixtures.

The average duration of sucking the diet was the lowest compared with the values for the other designs. Sucking duration was confined to the short liquid-phase span.

3. Presenting a diet drop via a thread connected to a little of the diet

The idea of creating that design consisted in presenting the diet via a thread continuously saturated with the liquid diet through diffusion. Continuous contact between the feeding part of the thread and the pot liquid ensured long-term reconditioning. Hence, the liquid diet in the pot did a good job. The diet was presented through a thread that occupies a long distance in comparison to a diet drop. Thence, the chance of finding the diet by the mites has increased. Consequently, the average number of the feeding mites was always comparatively high (83.33 %), **Table** 2.

On the other hand, the presence of the diet among the thread fibers may have allowed feeding without drowning in the diet or sticking to it. By pulling the thread, the solid diet-saturated piece of thread could be easily removed without jeopardizing the mites. In contrast, by following the other five designs, some mite individuals were jeopardized while removing the previously used diet.

4. Placing a diet drop in a tiny plastic pot

The idea of creating that design consisted in contracting the drop of the diet in a small room to reduce the area of the diet surface exposed to solidification agents such as aridity. Hence, the surface of the diet took a long time to solidify in comparison to the thin film of the design based on placing a diet drop directly on the dish. On the other hand, the area of the diet surface to which the mites were exposed was reduced, aiming to reduce the number of mites that were prone to sticking to the diet.

5. Placing the dish on which a drop of the diet is located, in a tray containing a little water

The idea of creating that design consisted in moisturizing the diet surface continuously to inhibit surface solidification. The humid air around the diet drop, which resulted from water evaporation, did a good job.

Despite that design succeeded in achieving a long liquid-phase span, exaggerated relative humidity around the mites may cause an undesirable microclimate, which is probably unsuitable for mite progress. Commercial mass production in the laboratory is relatively easy once the biological requirements of the mites have been met. **Ghazy *et al*. (2016)**. Furthermore, the increase in the humidity around the mites led to a decrease in the numbers of the feeding mites, as sho0wn in **Table** (2). Moreover, extra moisture on the dish surface may have hindered the mite's movement towards the diet. On the other hand, the average percentage of the mites that stuck to the diet within the whole liquid-phase span was comparatively high. That may be attributed to the alteration of the properties of the diet surface owing to extra humidity. The presence of dew around the diet drop may have complicated the situation; consequently, many individuals couldn't rescue themselves after touching the diet.

6. Placing a diet drop on a piece of cloth connected to a water-saturated thread

The idea of creating that design consisted in wetting the diet surface continuously to inhibit surface solidification. The wet thread attached to the cloth piece transferred water to it continuously through diffusion. Hence, it did a good job. It's worth stating that the purpose of covering the vial with a lid was to prevent the mites from drowning in the water on touching it. Furthermore, the lid hole was rather loose, to allow water diffusion through the thread.

The average percentage of the mites that stuck to the diet within the whole liquid-phase span was comparatively low. That may be attributed to the presence of the cloth fibers, which may have enabled the mites to touch the diet without drowning in it. Despite the encouraging outcomes of that design, the continuous water supply may not be suitable for successful mite rearing owing to the undesired consequences of diet diluting. Accordingly, the average percentage of the feeding mites decreased with time, Table 2. That matches the results of **Elshazly (2022 b)**, who proved that the diet utilized is preferable to water.

The most efficient design

Given the foregoing, the three designs based on reconditioning the diet by supplying it with either a more liquid diet or water were the best designs for prolonging the liquid-phase span of the diet. However, reconditioning the diet by supplying it with water may affect its properties and create an unfitting microclimate around the mites. The potential of phytoseiid mites is always suppressed, and their performance is lowered by environmental stress, which adversely affects development, reproduction, survival, and overall biocontrol potential. **Ghazy et al. (2016)**. **San *et al*. (2021)** found that the RH level and water availability affect the development and reproduction of *A. swirskii*. Thereupon, the design based on reconditioning the diet by supplying it with a more liquid diet through diffusion, *i.e.*, the design based on providing the mites with a diet-saturated piece of thread connected to a little of the diet, is considered to be the best of those three designs. The value of the liquid-phase span that resulted from that design represented the third rank amongst the liquid-phase span values, which were

arranged in ascending order. On the other hand, no mite stuck to the diet by applying that design.
The advantages of that design are as follows:
1. No mite individual sticks to the diet.
2. As for the diets which go adhesive with time owing to the alteration of their properties, it is possible to pull the thread before reaching that critical phase to avoid mite sticking.
3. Increasing the chance of finding the diet by the mites; whereas, the diet is presented through a thread that occupies a long distance in comparison to a diet drop.
4. Prolonging the edibility span of the diet due to prolonging its liquid-phase span by connecting the thread to the diet located in the pot.
5. The duration of sucking the diet was comparatively high.
6. No need to change the normal microclimate around the mites.
7. No need to supply the diet with extra water with time.
8. The ability to change the diet for another one without jeopardizing the mites.

CONCLUSION

To feed the individuals of the predatory mite *A. swirskii* on a liquid artificial diet, it is advisable to provide the mites with a diet-saturated piece of thread connected to a little of the diet. When the piece of thread turns solid, it can be pulled to be replaced with the next diet-saturated piece.

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الملخص العربى

تصميم جديد لتغذية الحلم المفترس *Amblyseius swirskii* على غذاء مُصنع سائل

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تم تجربة ستة تصميمات مختلفة لقياس كفاءة كل منها فى تغذية الحلم المفترس *Amblyseius swirskii* على غذاء مُصنع سائل، و ذلك وفقًا لأربعة معايير: استمرارية الحالة السائلة للغذاء، و نسبة الاكاروسات التى تتجمع للتغذية، و نسبة الاكاروسات التى تلتصق بالمادة الغذائية، و مدة التغذية.

كان التصميم الأعلى كفاءة هو المبنى على أساس إمداد الأكاروسات بخيط مشبع بالمادة الغذائية و متصل بقليل من نفس المادة الغذائية. حيث يتم مسبقاً تمرير الخيط بوعاء سعة 10 مل محتوٍ على الغذاء السائل. عند جفاف الجزء من الخيط المخصص لتغذية الأكاروسات, يتم سحبه ليحل محله الجزء التالى من الخيط المشبع بالغذاء السائل. بتطبيق ذلك التصميم لتغذية الأكاروسات على غذاء مُصنع سائل يتكون من لبن منزوع الدسم و عسل نحل و صفار بيض و خميرة الخبز و أحماض أمينية 10% بنسب حجمية 100: 1: 1: 20 :1 على الترتيب، فإن المادة الغذائية المتواجدة بالجزء من الخيط المخصص لتغذية الأكاروسات ظلت بالحالة السائلة لمدة 3 ساعات تقريبًا ثم جفت. أما المادة الغذائية السائلة المتواجدة بالوعاء ظلت لمدة 5 ساعات قادرة على تشبيع أجزاء متتالية من الخيط، ثم تخثرت. بعد 30 دقيقة من بداية التغذية بلغت نسبة الاكاروسات المتجمعة للتغذية 83.33% دون التصاق أى فرد بالمادة الغذائية. و كان متوسط مدة تغذية الأكاروس 62.33 دقيقة.

مميزات هذا التصميم الجديد:

1- لم يلتصق أى أكاروس بالمادة الغذائية.

2- بالنسبة للمواد الغذائية التى تصبح لزجة بمرور الوقت، يمكن سحب الخيط قبل الوصول الى هذه المرحلة الحرجة، لتفادى التصاق الأكاروسات بالمادة الغذائية.

3- زيادة فرصة الأكاروسات للعثور على الغذاء حيث يتم تقديم الغذاء خلال خيط يشغل مسافة طويلة بالمقارنة بتقديم قطرة من الغذاء.

4- إطالة مدة بقاء المادة الغذائية فى حالة سائلة.

5- مدة تغذية الأكاروس تكون طويلة نسبيًا.

6- عدم الحاجة الى زيادة الرطوبة النسبية بالوسط المحيط بالمادة الغذائية لترطيبها.

7- عدم الحاجة الى اضافة ماء باستمرار للمادة الغذائية لترطيبها.

8- القدرة على إحلال المادة الغذائية الجافة بأخرى سائلة بدون تعرض الأكاروسات للخطر.