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PRODUCTION OF PACKAGE BEES USING THE BIOACTIVE AGENT BIOACTIVE IN FEEDING PROCESS

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ABSTRACT: *This work was conducted in the Apiary of Plant Protection Institute at Quantar, Qaluobia to study the effect of additive bioactive product (contains two bacteria: Lactobacillus acidophilus; Bifidobacterium sp and Spirulina) to sugar syrup (1:1) as a stimulant substance to increase brood rearing and queen's egg laying to produce package bees through the period of 22/7/2012 to 20/09/2012. Results revealed that feeding the honey bee colonies on additive 5 or 10 cm from bioactive product with sugar syrup (1:1) it reared fed significantly more brood than the control colonies were fed with sugar syrup only. Generally, the maximum brood production and queens eggs laying were obtained when colonies were fed with 10 cm bioactive compared to 5 cm. It can be concluded that the beekeepers can to produce of much numbers of package pees and consequently obtained much of money.*

Key words: *Honey bees; Lactobacillus acidophilus; Bifidobacterium sp.; Spirulina.*

INTRODUCTION

After extracting honey in June, the population of workers decreased and the beekeepers are need producing the package bees. The simulative effect of Bioactive mixed with sugar syrup feeding in brood rearing and queen's eggs laying was studied. The sugars, water essential amino acids, fats and vitamins contribute to phago-stimulation. The amount of a synthetic diet consumed by honey bees was found to vary in relation to its content of specific amino acids (Groot, 1953). The pollen substitute (PS) was apatty made from sucrose, dairy products, yeast, chlorella and fruit extracts, plant oils, vitamins, minerals and amino acids. When fed to test colonies, each feed was effective in building up population (Watanabe, 1993). In spring and autumn we monitored the influence of additional feeding on brood, honey and pollen in honey bee colonies a vitamin-mineral preparation (Forssatom), brewers yeast and sugar syrup, in comparison with a control group. The greatest brood surface in the spring was recorded for the group additionally fed syrup with the vitamin-mineral preparation. It was 6.8% greater when compared to the control unsupplemented group. The greatest brood surface in the autumn was observed in the group additionally fed with yeast and it was 25.4% greater than in the control group. In the spring the greatest honey surface was recorded in the group additionally fed on syrup with yeast (37.8% higher than the control). In the autumn the highest values were reached in the group additionally fed on the vitamin-mineral preparation, namely, 181.7% higher than in the control hives (Mladenovic *et al*., 1999). The effects of both beekeeping processes (compressed bees (CB) and traditional beekeeping (TB) and food diets (plain sugar syrup (1:1), sugar syrup (1:1) plus pollen grains (10%) and sugar syrup (1:1) plus pollen grains (10%) and fortified with vitamins) on the colony build up of honey bees (*Apis mellifera*) were investigated during February-April 2004 in Cairo, Egypt. Feeding colonies with supplementary vitamins plus pollen grains resulted in, after 4 brood cycles, significantly high daily rates of rearing brood (523 and 434 brood cells for CB and TB, respectively) and drawing combs (4.31 and 1.61 combs for CB and TB, respectively) compared to either pollen grains (432 and 338 brood cells and 3.20 and 1.19 combs for CB and TB, respectively) or plain sugar syrup (314 and 219 brood cells and 2.10 and 0.79 combs for CB and TB, respectively). On the other hand, the

worker's longevity was 21.2, 26.2 and 23.8 days for colonies fed on vitamins plus pollen grains, pollen grains and sugar syrup, respectively. The workers of colonies fed on vitamins plus pollen grains, pollen grains and plain sugar syrup hoarded 236, 220 and 191 mg of sugar syrup/3 days, respectively (Elbassiouny, 2006). The effect of feeding honey bee colonies with pollen substitutes on the sealed brood area (in sq. inch) which were taken periodically at 12 days and egg laying of Queens intervals were significantly increased than control colonies which were fed on sugar syrup (1:1) only (Ghazala, 2006). Furthermore, the effect of some pollen substitutes on some biological activities of honeybee colonies was investigated in Cairo, Egypt, which used four feeding materials i.e.: pollen substitutes: Diet A=1000 g sugar+1000 ml water (control); Diet B=liquid yeast (*Candida tropicalis*) at 25% (1000 g sugar+250 ml liquid yeast+750 ml water); Diet C=dried brewer's yeast (*Saccharomyces* sp.) at 25% (1000 g sugar+250 g dried brewer's yeast+750 ml water); Diet D=400 ml liquid yeast+200 g soyabean (lipid-free)+300 g bran+100 g corn flour+1000 g sugar; and Diet E=200 g dried brewer's yeast at 25%+400 g soyabean (lipid-free)+400 g barley (apical+roots)+1000 g sugar, and found that the diet B had the highest value of mean amounts of sealed worker brood at different dates during the experimental period (Ashour *et al*., 2008).

This work was conducted to study the effect of Bioactive as a source of vitamins and amino acids on brood rearing and eggs laying of honey bee queens during the period of 22/7 to 20/9/2012 in Quantar region in comparison with ordinary feeding syrup in the commercial production of package bees process during this period which characterized by deficiency of feeding sources.

MATERIALS AND METHODS

The experiment was carried out under the Apiary conditions at the Institute of Plant Protection in Quantar, Qaluobia governorate during the period of 22/7 to 20/09/2012. The worker brood areas a standard frame divided to square inches were used. Brood areas were measured every 12 days until 20/9/2012. The first inspection of brood was taken just before the beginning of the experiment on 22/7 - 20/9/2012.

Honey bee strains and numbers:

The strength colony contains at least eight standard frames covering with bees. These colonies were headed with equal queen ages. Nine honey bee F1 carniolan were selected. The colonies have been divided into 3 groups (each of 3 colonies) of about equal brood areas and queen eggs laying.

Substance used:-

Bioactive product is a mixture from two bacteria i.e. *Lactobacillus acidophilus* and *Bifidobacterium* spp. as well as the blue green algae Spirulina which rearing above Molas in El-Shefaa- Station El-Kom El-Khadar, El-Menfouia.

Lactobacillus acidophilus (Fig. 1) is the most commonly used probiotic, or friendly bacteria. *L. acidophilus* is a member of one of the eight main genera of lactic acid bacteria. Each genus and species have different characteristics but they are generally chained cocci or rod shaped Gram-positive, nonmotile, that produce lactic acid as a major or sole product of fermentative metabolism and use lactose as their main source of carbon to produce energy. *L. acidophilus* grows in or without the presence of oxygen and it is able to live in highly acidic environments of pH 4-5 or lower (C:\Users\\Lactobacillus\Lactobacillus acidophilus 2can Support Portal EBI.mht).

Bifidobacterium spp. (Fig. 2) are considered as important probiotics and used in the food industry. Different species and/or strains of *bifidobacteria* may exert a range of beneficial health effects, including the regulation of intestinal microbial homeostasis, the inhibition of pathogens and harmful bacteria that colonize and/or infect the gut mucosa, the modulation of local and systemic immune responses, the repression of procarcinogenic enzymatic activities within the microbiota, the production of vitamins.

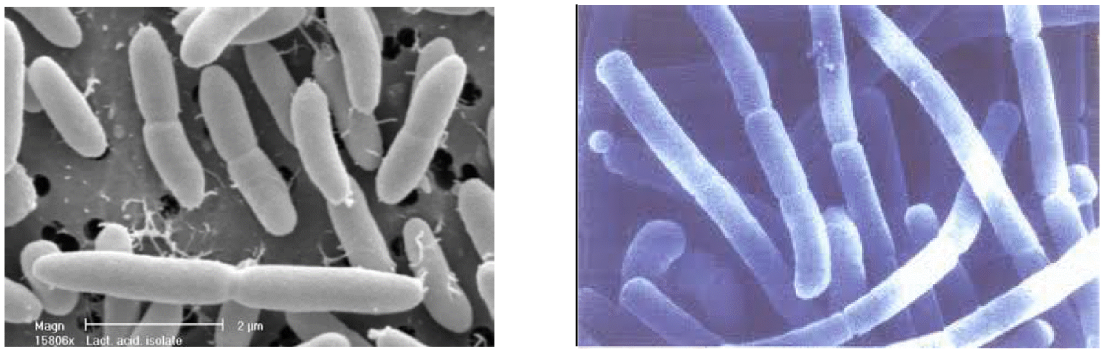

Figure (1): The rod shape of the bacterium *Lactobacillus acidophilus*.

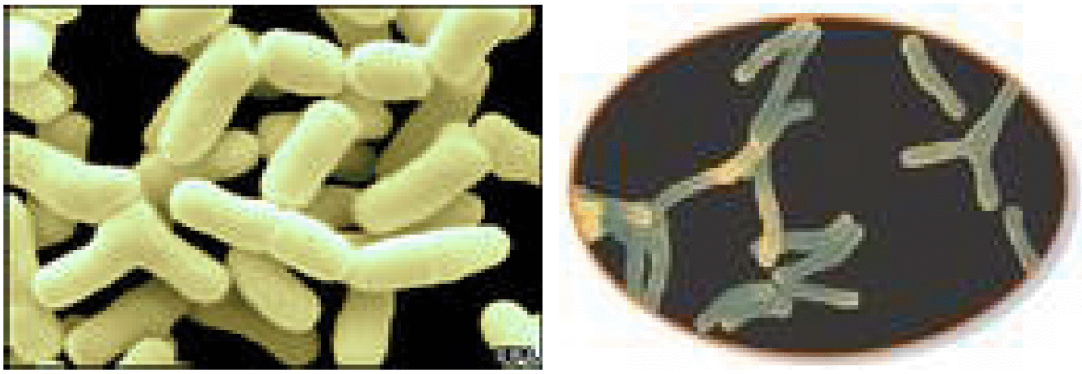

Figure (2): The rod shape of the bacterium *Lactobacillus acidophilus*.

Spirulina (Fig. 3) is a type of blue-green algae that is rich in protein, vitamins, minerals, and carotenoids, antioxidants that can help protect cells from damage. It contains nutrients, including B complex vitamins, beta-carotene, vitamin E, manganese, zinc, copper, iron, selenium, and gamma linolenic acid (an essential fatty acid). It can also absorb heavy metals from the water where it is grown (http://www.umm.edu/altmed/articles/spirulina-000327.htm)

Bioactive is work about synthesis vitamins and amino acids. The test colonies were feed by bioactive(5 cm and 10 cm) mixed with sugar syrup (1:1) twice weekly per colony.

Treatments:

The following three groups of nine colonies diets as follow:

1- Three colonies were fed with 5 cm of bioactive mixed with sugar syrup (1:1).

2- Three colonies were fed with 10 cm of bioactive mixed with sugar syrup (1:1).

3- Three colonies were fed on sugar syrup only (1:1) as control.

To accounts the inches of sealed brood the frame sealed brood in standard frame according to Omar (1998). Brood areas were measured every 12 days according to the equation of Shoreit and Hussein (1993) in square inches then transferred the brood inches to number of brood cells as follow:

$$\text{Number of cell} = \frac{\text{Brood area (inches x 25 (number of workers of cells per inches)}}{\text{12 days}}$$

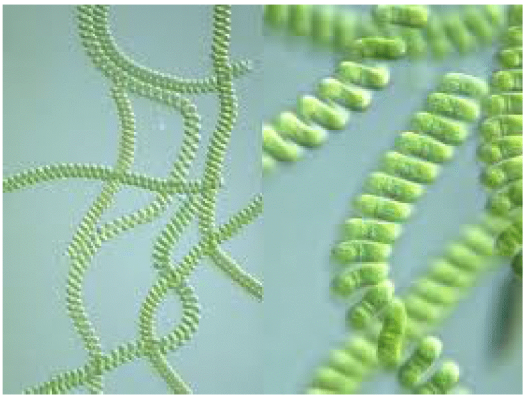

Figure (3): The blue-green algae Spirulina.

Statistical analysis:

The analysis was conducted according to (Sendecor and Cochran, 1971) and M. static computer analysis program.

RESULTS AND DISCUSSION

In Quanter region during the period from 22/7 until 20/9/2012, data of the effect feeding with bioactive (5 cm & 10 cm) plus sugar syrup or sugar syrup alone as compared with unfed colonies (control), on brood production in honey bee colonies and the egg laying of queens to produce the package bees.

1- Brood rearing:

Data indicated that in Table (1) and Fig. (4), the first reading that took one day before feeding indicated no significant difference between the mean value of sealed brood area for the three tested groups of honey bee colonies. Data showed that the average brood area of all treatments were more than the control colonies. The colonies were fed with bioactive(10 cm) mixed with sugar syrup showed an increase of brood area followed the colonies with fed bioactive (5 cm) mixed with sugar syrup.

Data clearly that the general means of brood area/ colony in all treatments were significantly than control which were fed in sugar syrup (1 : 1) only. The diet bioactive(10 cm) gave the highest amount of brood production (510.99) followed by bioactive(5 cm) giving (401.38), while control gave the lowest amount during study of period (315.77).

2- Queens egg laying.

Data clearly that in Table (2) and Fig. (5), the 1st reading that took one day before feeding indicated no significant difference between the mean value of queens egg laying for the three tested groups of honey bee colonies. Data showed that the average queens egg laying of all treatments were more than the control colonies. The colonies were fed with bioactive(10 cm) mixed with sugar syrup showed an increase of queens egg laying followed the colonies with fed bioactive(5 cm) mixed with sugar syrup than the control.

Data reflected that the general means of queens egg laying/colony all treatments were significantly than control which were fed in sugar syrup (1 : 1) only. The diet bioactive(10 cm) (891 egg/colony) gave the highest amount of queens egg laying followed bioactive(5 cm) (844 egg/colony), while control (659) gave the lowest amount during study of period. There were significantly differences between diets.

Table (1): Effect of feeding mixed with bioactive on the sealed brood area during 2012.

Diet	Dates	22/07	03/08	15/08	27/08	08/09	20/09	Grand mean
		Average numbers of sealed brood / one inch ^{2}						
Bio–active	Diet 5 cm	268.66 a	307.66	341	455.66	472.66	562.66	401.38
	Diet 10 cm	268.33 a	332.66	349.33	978	484.33	653.33	510.99
Control Sugar syrup		266.66 a	254.66	312.66	331.66	357.33	371.66	315.77
Total		803.65	894.98	1002.99	1765.32	1314.32	1587.65	1228.14
Mean		267.88	298.33	334.33	588.44	438.11	529.22	409.38
L.S.D at 5 %		18.18	13.62	14.08	19.37	27.39	15.29	13.26
L.S.D at 1 %		27.45	20.62	21.32	29.33	41.47	23.15	21.35

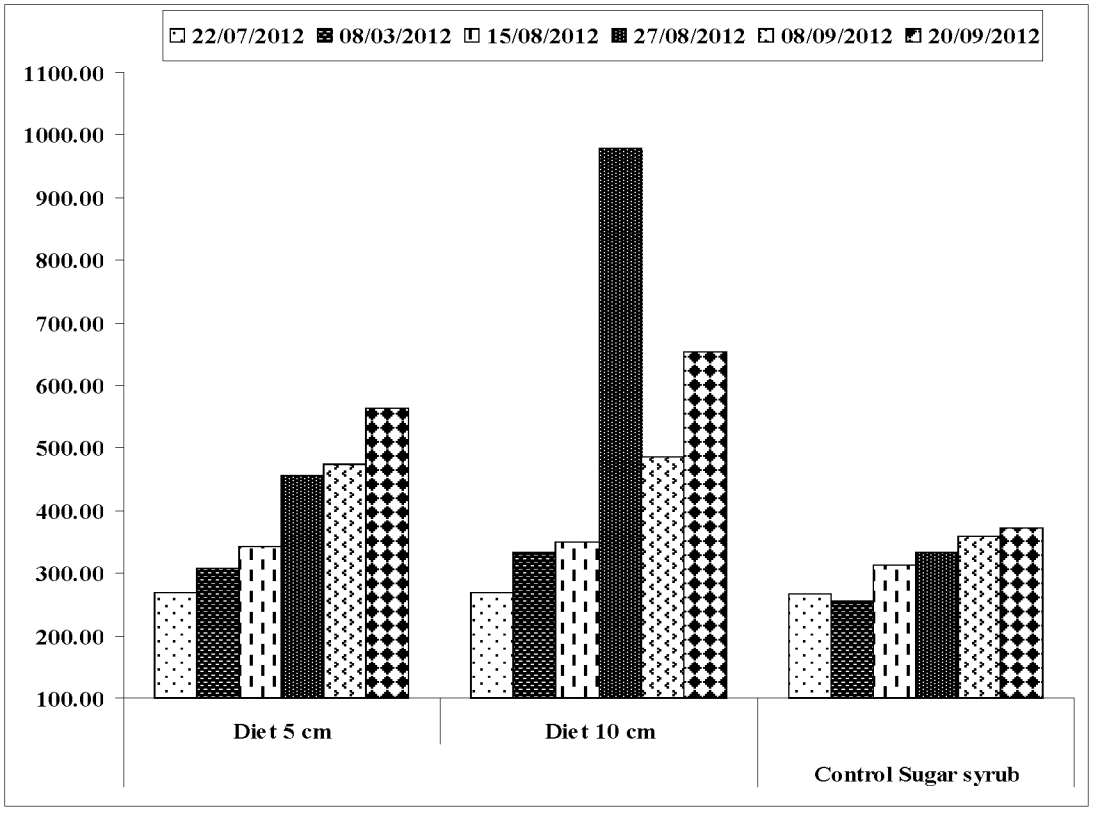

Fig. (4): Effect of feeding mixed with bioactive on the sealed brood area during 2012.

Table (2): Effect of two doses of the feeding diet bioactive(5 & 10 cm) on the queens egg laid in the colonies at Quanater region during 2012 to produce the package bees.

Diet	Dates	22/07	08/03	15/08	27/08	08/09	20/09	Grand mean
		Average numbers of laid eggs						
Bio-active	Diet 5 cm	560	691	710	949	985	1172	845
	Diet 10 cm	559	693	728	996	1009	1361	891
Control Sugar syrup		557	531	651	690	748	775	659
Total		1676	1915	2089	2635	2742	3308	2394
Mean		559	638	696	878	914	1103	798
L.S.D at 5 %		37.74	28.23	29.09	39.95	57.02	31.94	30.21
L.S.D at 1 %		57.14	42.75	44.04	60.49	86.35	48.37	45.8

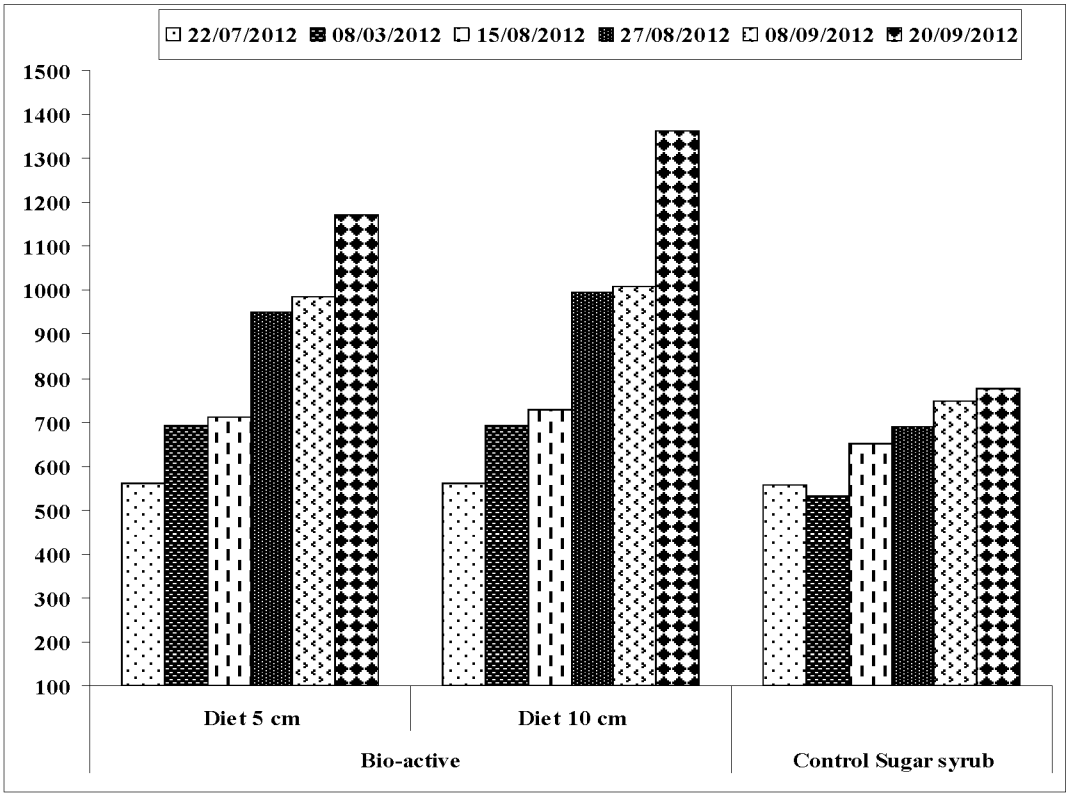

Fig. (5): Effect of two doses of feeding diet (bioactive) (5 & 10 cm) on the queens egg laid per queen in the colonies at Quanater region during 2012 in the package bees process.

Conclusion

The production of package bees associated with brood and queens rearing. The package bees is need to one queen plus one kilogram of workers (1kg workers=10000 workers).

The obtained results indicate that the beekeepers could be obtain the following:

- When the colonies feed with 10 cm bioactive mixed with sugar syrup produce: 891 eggs x 60 days (experiment period) = 53460 equal 5.346 package bee/colony
- When the colonies feed with 5 cm bioactive mixed with sugar syrup produce: 844 eggs x 60 days (experiment period) = 50640 equal 5 package bee/colony
- When the colonies feed with sugar syrup only (control) produce: 659 eggs x 60 days (experiment period) = 39540 equal 3.954 package bee/colony.

If the apiary containing about 100 colonies x 5.346 package bees x 80 Egyptian pounds it can be the beekeeper obtain about 42.768 Egyptian pounds, and increase the economic income in this period.

REFERENCES

Ashour, A. T., M. E. Zakaria, H. M. Hammad and M. E. Nour (2008). Effects of some diets as pollen substitutes on certain biological activities of honeybee colonies. Bulletin of Faculty of Agriculture, Cairo University, Faculty of Agriculture, Cairo University 59 (2): 96-102.

Elbassiouny, A. M. (2006). Effect of vitamin additive and colony management on honey bee performance. Arab Universities Journal of Agricultural Sciences. Faculty of Agriculture, Ain Shams University. 14 (1): 427-438.

Ghazala, Naglaa, E. (2006). Propolis and pollen as products of honeybee colonies and their biological properties. Ph.D. Agricultural Science of Economic Entomology, Faculty of Agriculture Shiben El-Kom, Menoufiya University, 206 pp.

Groot, A. P. De. (1953). Protein and amino acid requirements of the honeybee. Physiol. Comp. 3 (2/3): 1-90.

Mladenovic, M., V. Mlaan and N. Dugalic Vrndic (1999). Effects of a vitamin-mineral preparation on development and productivity of bee colonies. Acta Veterinaria (Beograd). 1999. 49 (2/3): 177-184.

Omar, R. E. (1998). Studies on some honey bee races in Egypt. Ph.D. Thesis, Fac. of Agric., Moshtohor, Zagazig Univ.

Shoriet, M. N. and M. N. Hussein (1993) . Field tests with some protein supplements for feeding bees at Assuit Governorate . Egypt. J. Appl. Sci., 8 (6) : 366- 375.

Snedecor, G.W and G. Cochran (1973). Statistical methods 6th Ed .Lousa state Univ. Press Iowa USA.560pp

Watanabe, H. (1993). Effect of a pollen substitute and a sugar additive on honey bees. Honeybee science, 14 (3): 133-135.

http://www.umm.edu/altmed/articles/spirulina-000327.htm.

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إنتاج طرود النحل المرزوم باستخدام المنشط الحيوى البيو أكتيف فى عملية التغذية

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الملخص العربى

أجرى هذا البحث لدراسة تأثير استعمال البيو أكتيف (طحالب + بكتيريا) بنسبة (1 : 1) كمنشط غذائى لطوائف نحل العسل وتشجيعها على إنتاج الحضنة ومعدل وضع الملكة للبيض لإنتاج طرود نحل مرزوم وذلك خلال الفترة التى بها قلة فى الغذاء.

أجرى هذا البحث خلال عام 2012 فى الفترة من 2012/7/22 إلى 2012/9/20 بمحطة بحوث النحل بالقناطر الخيرية التابعة لمعهد بحوث وقاية النباتات.

وقد أشارت النتائج أن الطوائف المغذاة بإضافة (10 سم) من البيو أكتيف إلى التغذية السكرية أدت إلى فروق معنوية بالمقارنة بطوائف الكنترول المغذاه بالمحلول السكرى فقط (1 : 1)، وكذلك الطوائف المغذاه بإضافة (5 سم) من البيو أكتيف إلى التغذية السكرية أدت إلى فروق معنوية بالنسبة لطوائف الكنترول المغذاه بالمحلول السكرى فقط (1 : 1) ، كانت التغذية تتم مرتين أسبوعياً.

وثبت أن استخدام البيو أكتيف المكون من الطحالب والبكتيريا وتربيتهم على المولاس يصلح كمصدر رخيص وسهل كمنشط لطوائف نحل العسل فى منطقة القناطر وزيادة أعداد طوائف النحل فى هذه الفترة (شهرى أغسطس وسبتمبر) فترة التجربة. حيث تكون الطوائف ضعيفة بعد فرز عسل البرسيم فى شهر يونيو ولا يستطيع النحال أن يفى بطلبيات طرود النحل المرزوم المطلوب منه فى هذه الفترة. وبالتالى يساعد البيو أكتيف النحاليين فى إنتاج طرود النحل المرزوم فى هذه الفترة والحصول على دخل إقتصادى.

وقد أشارات البيانات المتحصل عليها من هذا البحث أن الطوائف التى تمت تغذيتها بإضافة (10 سم أو 5 سم) من البيو أكتيف للتغذية السكرية أنتجت حضنه أكثر معنوية بالمقارنة بالطوائف المغذاه على المحلول السكرى فقط (الكنترول)، وكان أعلى متوسط إنتاجية للحضنه عند إضافة (10 سم) من البيو أكتيف للمحلول السكرى (510.99) لكل طائفة يليها عند إضافة (5 سم) من البيو أكتيف (410.33) لكل طائفة ثم طوائف المقارنة (315.77) لكل طائفة.