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# شجيرات الفلفل البرازيلي كمصدر للرحيق وحبوب اللقاح لطوائف نحل العسل فى خريف مصر

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**الملخص العربي**

أجريت هذه التجربة لتسجيل كفاءة أزهار شجيرات الفلفل البرازيلي والمنزرعة حول منحل محطة بحوث الصباحية بالإسكندرية كمصدر لإنتاج العسل وحبوب اللقاح تم استخدام ٩ طوائف نحل عسل متساوية فى القوة هجين أول كرنيولي خلال أغسطس وسبتمبر ٢٠١١ حيث تم حساب معدل سروح شغالات نحل العسل خلال شهر سبتمبر وذلك لمدة دقيقة واحدة فى اليوم كل ثلاثة أيام أي بمعدل ١٠ مرات فى الشهر ( كل ملاحظة يتم حساب عدد الشغالات السارحة / دقيقة بثلاثة مكررات ) من أمام مدخل الطوائف .

وتم استخدام تسع مصايد لحبوب اللقاح تم تعليقها أمام مدخل الخلايا وتم حساب متوسط كمية حبوب اللقاح المتجمعة فى كل مصيدة بالجرام لكل طائفة لمدة ٢٤ ساعة وتم حساب ذلك كل ثلاثة أيام أي بمعدل عشر مرات فى الشهر . كما تم حساب مساحة الحضنة خلال شهر أغسطس وسبتمبر وتم حساب انتاج العسل خلال شهر سبتمبر ٢٠١١ .

أظهرت النتائج المتحصل عليها أن متوسط معدل سروح شغالات نحل العسل تراوح بين ١٨.٧ إلي ٣١.٤ شغالة / خلية / دقيقة خلال شهر سبتمبر .

وتراوحت كمية حبوب اللقاح المتجمعة من المصايد بين ١٨.٨ جم إلي ٥٠.٥ جم / مصيدة / طائفة / يوم خلال شهر سبتمبر أيضاً .

وتراوحت متوسط مساحة الحضنة بين ٤١٨ بوصة مربعة إلي ٦٥٢ بوصة مربعة لكل طائفة. وبلغ متوسط انتاج الطائفة من العسل ٢.٩ كجم خلال شهر سبتمبر ٢٠١١ .

توصي نتائج البحث بالتوسع في زراعة شجيرات الفلفل البرازيلي حول المناحل حيث أنها مصدر جيد للرحيق وحبوب اللقاح فى وقت يندر فيه مصادر الرحيق وحبوب اللقاح ، كما ان عسل الفلفل البرازيلى له اهمية طبية فى علاج كثير من الامراض مما سيرفع من قيمتة التسويقية.

# THE BRAZILIAN PEPPER TREES, A NEW SOURCE OF POLLEN GRAINS AND NECTAR FOR HONEYBEE COLONIES AT AUTUMN OF EGYPT

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**ABSTRACT:** *These experiments were conducted at the apiary of Beekeeping Research Unit at El-Sabahia Experimental Station , Alexandria Governorate. Egypt , along two months August and September 2011 . Nine honeybee colonies of Carniolan hybrid were chosen to study the possibility of breeding these colonies under the shrubs of Brazilian pepper , Shinus terebinthifolius as a source of nectar and pollen grains during the critical dearth period of flowers. Statistical analysis of the obtained data indicated that there were no significant differences in the total numbers of foraging bee workers/ 10 minute/ colony among the tested colonies, where the numbers were ranged between 234 to 261. The highest weight of pollen grains was calculated as 361.6 g , while the lowest average weight was 331.3 g with significant differences among them (LSD 5% = 3.33). The highest mean value of brood area was recorded with the third observation (652 inch$^2$) with total value of 5868 inch$^2$ for the nine colonies, followed by the fourth observation recording mean value of (581 inch$^2$) with total value of 5229 inch$^2$ , while the second and first observation gave less values recording 418, 432 inch$^2$ with total values of 3762 , 3888 inch$^2$, respectively. Regarding to the yield of honey as produced through the feeding of tested colonies on the nectar and pollen grains of Brazilian pepper shrubs , results indicated that there were great differences in the amounts of honey among the tested colonies . Honey yield ranged between 1.9 to 4.3 kg per colony with mean value of 2.9 kg per colony.*

**Key words***: Brazilian pepper, Brood, Honey bee, Pollen grains, Nectar***.**

## INTRODUCTION

Beekeepers are always interested in the behavior of honeybee , *Apis mellifera* L. under Egyptian ecology to achieve new sources of nectar and pollen grains, specially at cold weather of Autumn and Winter seasons where there were no flowers at almost cultivated plants. Honeybee colonies are the rich source of pollen grains, propolis and other products , as well as , they play an important role in the pollination of many species of agricultural crops (Haydak, 1970). The role of honeybees as a pollinator tool have increased with the increase of the cultivated area with different species of field crops and fruit trees. In several areas of the world, the pollination shortage is compensated by migratory of beekeeping with beekeepers supplying the hives during the crop bloom periods , and moving after the ending of bloom process, Javorek *et al.,* 2002. Honeybee workers collect pollen grains and used it as a rich source of protein which used in the process of brood rearing. Honey is the complex substance produce from nectar and sweet deposits collected from different cultivated field crops and fruit trees, which modified and stored in the honey combs of each colony by bee workers as a complex of inverted sugars mainly glucose and fructose (Root, 1975). Several studies were conducted to calculate the effect of the sources of nectar and pollen grains on pollen grains gathering activity, brood rearing, and honey production (Khattab,1976, El-shaarawy, 1989, Pearson, and Braiden. 1990, Serag El-Dien, 2004, Matilla, and Otis , 2006). The search for a new sources of nectar and pollen grains is very important specially at The period of cold months where no flowers are available,

Brazilian pepper shrubs, *Shinus terebinthifolius*, is a small evergreen trees , which has a long flowering period extend to the end of November month (Sanford, 1988, Ferriter , 1997, Hall *et al.,* 2006), and successfully grown in Egypt.

The aim of this research was to study the possibility of rearing honey bee colonies in the localities cultivated with the Brazilian pepper shrubs at the period from August to September where there were no sources of nectar and pollen grains.

## MATERIALS AND METHODS

These experiments were conducted at the apiary of Beekeeping Research Unit at El-Sabahia Experimental Station , Alexandria Governorate . Egypt , along two months August and September 2011 .

### 1-Foraging workers activity:

Nine honeybee colonies of Carniolan hybrid , were used for this study . The chosen colonies were equal in strength and established under the conditions of open area grown with Brazilian Pepper shrubs *Shinus terebinthifolius* which was cultivated more than 10 years ago . Experimental colonies were observed along 2 months every 3 days , where the numbers of foraging workers were counted. Every observation ( number of foraging workers / colony / one minute ) was recorded every 3 days at ten o'clock morning . Each observation was lasted one minute and replicated 3 times.

### 2-Pollen gathering activity:

The previous colonies were used for this test . The pollen traps were hanged at the entrance of colonies. The traps were similar to types used by Sung (1974), Taber (1984), Atallah *et al.,* (1989) and Dimou & Thrasyvoulou (2007) and Mansouer, *et al*., (2008).

The traps were emptied every one day and don't hanged at entrance of colonies for two days due to feeding of honey bee workers. The trapped pollens were transferred to the Bee Research laboratory El-Sabahia Experimental Station , where it was cleaned from other materials and weighted as (g) / colony.

### 3- Brood rearing activity:

The previous colonies were used for this test to determine the brood rearing activity as effected by feeding on the pollen and nectar of Brazilian Pepper shrubs , where sealed brood areas were measured in square inches ($inch^2$ ) at 12 day intervals starting from 25/8/2011 , till 27/9/2011 , according to Fresnay , 1962 , and Altakrity, *et al.,* 1971.

### 4-Honey yield :

At the end of the experiment . honey yield was extracted and weighted as kg / colony ( Shawer , 1987 ) .

### 5-Statistical analysis :

Data were statistically analyzed according to the software computer program Costat 22 (1998) .

## RESULTS AND DISCUSSION

Results in Table (1) show the average numbers of foraging bee workers/ minute/ colony to Brazilian pepper flowers during the period of 31/8 to 27/9/2011 at El-Sabahia experimental Station. Statistical analysis of the obtained data indicated that there were no significant differences in the total numbers of foraging bee workers/ 10 minute/ colony among the tested colonies, where the numbers were ranged between 234 to 261, while there were significant differences in the mean numbers of foraging bee workers/ minute/ 9 colony among the observation days (LSD 5% = 1.41), where the highest mean numbers were recorded at 9/9 and 18/9/2011 (31.4, 31.2) .

Results in Table (2) indicated that there were significant differences in the weights of collected pollen grains among tested colonies (LSD 5% = 5.05). The highest weights of pollen grains were recorded at 13/9/2011, 19/9/2011, and 10/9/2011 giving 53.3, 50.5, and 50.3 g per colony without significant differences. The lowest weights of pollen grains were recorded at 25/9/2011 , 4/9/2011 , and 1/9/2011 giving 18.8, 19.4, and 23.0 g per colony without significant differences. It could be concluded that Brazilian pepper are a good source for pollen grains.

**Table (1): Ave. no. of foraging workers/ minute/ colony to Brazilian pepper flowers during the period of 31/8 to 27/9/2011 at El-Sabahia experimental Station.**

| Colony number | Ave. no. of foraging workers ( one minute ) / colony | | | | | | | | | | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 31/8 | 3/9 | 6/9 | 9/9 | 12/9 | 15/9 | 18/9 | 21/9 | 24/9 | 27/9 | |
| 1 | 18 | 18 | 25 | 30 | 26 | 24 | 32 | 28 | 21 | 19 | 241 |
| 2 | 24 | 17 | 26 | 37 | 26 | 25 | 31 | 28 | 19 | 18 | 251 |
| 3 | 21 | 19 | 26 | 35 | 28 | 22 | 29 | 24 | 22 | 23 | 249 |
| 4 | 19 | 22 | 24 | 28 | 32 | 25 | 28 | 33 | 18 | 22 | 251 |
| 5 | 17 | 22 | 23 | 22 | 30 | 29 | 31 | 32 | 17 | 23 | 246 |
| 6 | 22 | 15 | 28 | 34 | 18 | 30 | 34 | 39 | 16 | 25 | 261 |
| 7 | 19 | 21 | 27 | 36 | 18 | 24 | 35 | 28 | 19 | 19 | 246 |
| 8 | 20 | 20 | 19 | 31 | 32 | 25 | 32 | 27 | 20 | 19 | 245 |
| 9 | 23 | 17 | 21 | 30 | 28 | 26 | 29 | 26 | 17 | 17 | 234 |
| Total | 183 | 171 | 219 | 283 | 238 | 230 | 281 | 265 | 169 | 185 | - |
| Mean | 20.3 ef | 19.0 ef | 24.3 d | 31.4 a | 26.4 c | 25.5 cd | 31.2 a | 29.4 b | 18.7 f | 20.5 e | - |

No significant differences was observed among tested colonies
LSD 5 % for columns = 1.41
Values in the column followed by the same letter(s) are not significantly different.

**Table (2): Average weights of *Schinus terebinthifolius* pollen grains collected by honeybee colonies during the period of 1/9/2011 to 28/9/2011.**

| Colony number | Average weights of collected pollen grains (g)/ trap / day | | | | | | | | | | Total pollen grains (g) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1/9 | 4/9 | 7/9 | 10/9 | 13/9 | 16/9 | 19/9 | 22/9 | 25/9 | 28/9 | |
| 1 | 23.7 | 23.3 | 28.2 | 52.7 | 53.2 | 45.7 | 51.8 | 28.7 | 17.7 | 27.2 | 352.2c |
| 2 | 27.3 | 21.2 | 26.1 | 48.3 | 55.4 | 44.2 | 52.3 | 34.6 | 19.8 | 27.4 | 356.6b |
| 3 | 25.7 | 18.9 | 31.4 | 49.4 | 54.2 | 41.2 | 49.4 | 25.7 | 16.6 | 26.6 | 339.1 f |
| 4 | 23.3 | 21.7 | 30.6 | 52.3 | 56.7 | 38.7 | 48.6 | 30.6 | 18.5 | 28.7 | 349.7cd |
| 5 | 18.7 | 17.2 | 26.7 | 50.2 | 48.2 | 50.5 | 46.7 | 26.7 | 18.6 | 27.8 | 331.3 g |
| 6 | 21.3 | 15.4 | 27.4 | 48.9 | 55.6 | 39.4 | 54.3 | 32.8 | 17.2 | 26.9 | 339.2 f |
| 7 | 22.8 | 16.5 | 29.3 | 49.7 | 54.7 | 41.6 | 54.2 | 28.9 | 22.7 | 26.7 | 347.1 d |
| 8 | 26.1 | 22.7 | 31.2 | 52.4 | 51.8 | 44.3 | 49.3 | 41.7 | 18.3 | 23.8 | 361.6 a |
| 9 | 18.6 | 17.8 | 33.5 | 48.6 | 49.7 | 42.7 | 48.2 | 31.6 | 20.1 | 32.2 | 343.0 e |
| Total | 207.5 | 174.6 | 264.4 | 452.5 | 479.5 | 388.3 | 454.8 | 281.3 | 169.5 | 247.3 | - |
| Mean | 23.0 de | 19.4 e | 29.4 c | 50.3 a | 53.3 a | 43.1b | 50.5 a | 31.3 c | 18.8 e | 27.4cd | - |

LSD 5% among row values = 5.05, LSD 5% among column values = 3.33.
Values in the column or row followed by the same letter(s) are not significantly different.

As for the average weights of collected pollen grains per colony during September month, results in Table (2) indicated that the highest weights was calculated as 361.6 g , while the lowest numbers was 331.3 g with significant differences among them (LSD 5% = 3.33).

Results in Table (3) indicated the average values of the of sealed brood area during the period of 25/8/2011 to 27/9/2011 as influenced by Brazilian pepper flowers at tested colonies. Statistical analysis of the data indicated that there were significant differences in the mean area of sealed brood (inch$^2$) / colony at the four observation periods (LSD 5%= 22.29) and ranged between 498 to 535 inch$^2$ . In addition, there were significant differences in the mean area of sealed brood (inch$^2$) / 9 colony among the four observation times (LSD 5% = 4.99) where the highest mean value was recorded with the third observation (652 inch$^2$) with total value of 5868 inch$^2$ for the nine colonies, followed by the fourth observation recording mean value of (581 inch$^2$) with total value of 5229 inch$^2$ , while the second and first observation gave less values recording 418, 432 inch$^2$ with total values of 3762 , 3888 inch$^2$, respectively.

Regarding to the yield of honey as produced through the feeding of tested colonies on the nectar and pollen grains of Brazilian pepper shrubs , results in table (4) indicated that there were great differences in the amounts of honey among the tested colonies. Honey yield ranged between 1.9 to 4.3 kg per colony with mean value of 2.9 kg per colony.

These results are in harmony with those obtained by Mohana, 1989, who studied the effect of Brazilian pepper on some aspects of honeybee colonies and found that the harvesting honey was calculated as a mean number of 6.85 kg per colony .

Results of this article gave the possibility of breeding honey bee hives under the Brazilian pepper shrubs at the critical dearth period of cold months with economic benefits where the obtained honey may be have useful and healthy characteristics where these species of shrubs grown as wild plants , as well as it has medical importance.

**Table (3): The effect of *Schinus terebinthifolius* cultivated around the honey bee hives on the area of sealed brood during the period of 25/8/2011 to 27/9/2011 at El-Sabahia experimental Station , Alexandria.**

| Colony number | Mean area of sealed brood (inch$^2$) / colony | | | | | |
|---|---|---|---|---|---|---|
| | First observation | Second observation | Third observation | Fourth observation | Total | Mean |
| | 25/8/2011 | 5/9/2011 | 16/9/2011 | 27/9/2011 | | |
| 1 | 390 | 455 | 650 | 588 | 2083 | 520.8 abc |
| 2 | 452 | 410 | 668 | 580 | 2110 | 527.5 ab |
| 3 | 440 | 423 | 600 | 565 | 2028 | 507.0 bc |
| 4 | 443 | 439 | 680 | 578 | 2140 | 535.0 a |
| 5 | 448 | 445 | 645 | 575 | 2113 | 528.3 ab |
| 6 | 447 | 449 | 670 | 572 | 2138 | 534.5 a |
| 7 | 460 | 393 | 660 | 584 | 2097 | 524.3 ab |
| 8 | 413 | 375 | 662 | 594 | 2044 | 511.0 abc |
| 9 | 395 | 373 | 633 | 593 | 1994 | 498.5 c |
| Total | 3888 | 3762 | 5868 | 5229 | - | - |
| Mean | 432 c | 418 d | 652 a | 581 b | - | - |

LSD 5% among column values = 22.29 , LSD 5% among row values = 3.99.
Values in the column or row followed by the same letter(s) are not significantly different

**Table (4): Weights of honey yield as produced after two months of feeding on the flowers of Brazilian pepper ,*Schinus terebinthifolius* at El-Sabahia Experimental Station , Alexandria.**

| Colony number | Weights of honey(kg) / colony |
|---|---|
| 1 | 1.9 |
| 2 | 2.8 |
| 3 | 3.1 |
| 4 | 4.3 |
| 5 | 2.2 |
| 6 | 2.7 |
| 7 | 3.2 |
| 8 | 2.9 |
| 9 | 2.8 |
| Total | 25.9 |
| Mean | 2.9 |

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# شجيرات الفلفل البرازيلي كمصدر للرحيق وحبوب اللقاح لطوائف نحل العسل فى خريف مصر

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## الملخص العربي

أجريت هذه التجربة لتسجيل كفاءة أزهار شجيرات الفلفل البرازيلي والمنزرعة حول منحل محطة بحوث الصباحية بالإسكندرية كمصدر لإنتاج العسل وحبوب اللقاح تم استخدام ٩ طوائف نحل عسل متساوية فى القوة هجين أول كرنيولي خلال أغسطس وسبتمبر ٢٠١١ حيث تم حساب معدل سروح شغالات نحل العسل خلال شهر سبتمبر وذلك لمدة دقيقة واحدة فى اليوم كل ثلاثة أيام أي بمعدل ١٠ مرات فى الشهر ( كل ملاحظة يتم حساب عدد الشغالات السارحة / دقيقة بثلاثة مكررات ) من أمام مدخل الطوائف .

وتم استخدام تسع مصايد لحبوب اللقاح تم تعليقها أمام مدخل الخلايا وتم حساب متوسط كمية حبوب اللقاح المتجمعة فى كل مصيدة بالجرام لكل طائفة لمدة ٢٤ ساعة وتم حساب ذلك كل ثلاثة أيام أي بمعدل عشر مرات فى الشهر . كما تم حساب مساحة الحضنة خلال شهر أغسطس وسبتمبر وتم حساب انتاج العسل خلال شهر سبتمبر ٢٠١١ .

أظهرت النتائج المتحصل عليها أن متوسط معدل سروح شغالات نحل العسل تراوح بين ١٨.٧ إلي ٣١.٤ شغالة / خلية / دقيقة خلال شهر سبتمبر .

وتراوحت كمية حبوب اللقاح المتجمعة من المصايد بين ١٨.٨ جم إلي ٥٠.٥ جم / مصيدة / طائفة / يوم خلال شهر سبتمبر أيضاً .

وتراوحت متوسط مساحة الحضنة بين ٤١٨ بوصة مربعة إلي ٦٥٢ بوصة مربعة لكل طائفة. وبلغ متوسط انتاج الطائفة من العسل ٢.٩ كجم خلال شهر سبتمبر ٢٠١١ .

توصي نتائج البحث بالتوسع في زراعة شجيرات الفلفل البرازيلي حول المناحل حيث أنها مصدر جيد للرحيق وحبوب اللقاح فى وقت يندر فيه مصادر الرحيق وحبوب اللقاح ، كما ان عسل الفلفل البرازيلى له اهمية طبية فى علاج كثير من الامراض مما سيرفع من قيمتة التسويقية.