

Studies on Some Secondary Products of Honeybees

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The present study was carried out in the apiary of El-A. mar, Kalubia, Honey bee Research, Ministry of Agric., El-Dokki, Giza and Organic Chemistry Dept., Faculty of Science, Ain-Shams University.

1- Clearly, an in-depth experimental assessment of the efficiency of two subspecies of honeybees as collectors of propolis, beeswax, from old combs and pollens were desirable. In this study we conducted the chemical composition of propolis and its biological activities. Accordingly, this study addressed the following questions for the secondary products of honeybees in Egypt. 1)- Do bees of the two races (F1 Italian bees and F1 Carniolan bees) have similar rates of propolis, pollen and brood-rearing activities? (2)- Do bees of both races collect similar amounts of propolis and pollens? (3)- Are the chemical of Egyptian propolis similar to other chemical of propolis produced in other countries. (4)- Do Egyptian propolis has different biological activities? (5) Which methods can be obtained. the propolis and beeswax from old combs. - ?

RESULTS: Propolis can be harvested by beekeepers only by scraping the walls of the hives, when changing their hives equipments, or when replacing combs. The amount of propolis harvested per colony depends on many factors. The race of bees, strength of the hive, plants and other vegetation, etc. - from buds such as (poplar) or from bark of trees. At time of need, however, bees will collect resinous substitute materials such as pitch and other terpenoid compounds. Also the yield of propolis depends on weather conditions and colony needs. The main topics which were taken in consideration in this study were: 1)- The comparison between two races: F1 Italian bees and F1 Carniolan bees. The following points: a)- Effect of different seasons on the rate of gathering propolis activity. b)- Sealed brood-rearing activity during a year of study, were conducted to study their effect on propolis gathering activity. c)- Some aspects about the chemical composition of Egyptian propolis. d)- Studied the biological activities of the propolis, which concluded its antibacterial, antifungal activity, treating *Braula coeca* and seed germination of wheat and broad bean by different extracts of propolis.

1- The amounts of Propolis Harvested by the Two subspecies: F1 Italian bees gathered 72.29 g/colony during two years of study, while F1 Carniolan bees gathered only 46.60 g/colony. The highest of propolis was gathered during July and August (10.71 and 16.33 g) and were (6.71 and 7.40 g) for the F1 Italian bees and F1 Carniolan bees, respectively. The lowest amount was gathered in December and January (1.94 and 2.59 g) for F1 Italian bees and (1.08 and 1.88 g) for F1 Carniolan bees, respectively. During the different seasons Italian bees gathered 19.09 to 31.05 g to 12.32 and 9.69 g propolis during Spring, Summer, Autumn and Winter, respectively. Less amount of propolis were gathered (14.17, 18.10, 7.60 and 6.55 g) by F1 Carniolan bees during four seasons, respectively.

2- Brood Rearing Activity in The Two Races: The amount of sealed broods measured for honeybee workers during the year of study were 16604.76 square inches and 12268053 in² by F1 Italian bees and F1 Carniolan bees, respectively. The results should that the highest activity on brood-rearing were in Spring (5981062 and 4432089 in²) by F1 Italian bees and F1 Carniolan bees, respectively.

3- Chemical Composition of Propolis: This investigation deals with identification of the chemical constituents of Egyptian crude propolis. The chemical constituents of the extraction obtained by different solvents such as water, ethanol, has been identified as known as beeswax, sakuranetin (4, 5-dihydroxy-7-methoxyflavone) and hydroxyalkylaminic acid derivative. The investigation deals also, with extraction of the crude propolis with different solvents

such as light petroleum (40-60, 60-80, 80-110 °C), benzene and ethyl alcohol, respectively. The residue obtained after evaporation of the solvents was dissolved in ether. The chemical analysis obtained the numbers of materials from 5, 6, 8, 10, 11 and 12 were oily matter and solid products remarked by 7, 9 and 13. While Soxhlet extraction with light petroleum, benzene, ethanol and acetic acid were identified as bees-wax and flavone derivatives (13 and 14) also identified some volatile oil and inorganic matter and ashes.

4- The Biological Properties of Propolis:

In these experiments propolis extraction and some its reactions were used on different organisms:

a) - **Antibacterial Activity:** The aim of this work was to prove the effect of propolis extractions in-vitro as antibacterial substance. The alcohol, acetone and water extracts were used against some food poison bacteria (*Staphylococcus aureus*, *Salmonella typhimurium*, *Salmonella newport*, *Escherichia coli* 078 J, *Escherichia coli* III and *P. roteus vulgaris*). Water propolis extract has an obvious bacteriostatic for the above bacteria. On the other hand, ethanol propolis extract and acetone propolis extract have a slight effect.

b) - **Antifungal Activity:** The derivatives of propolis such as sakuranin, cinamic acid and flavone were subjected to the study of their biological effect on fungus *A. niger* ap. Sakuranin decreased the length of germ tube with increasing its concentrations, it completely inhibited both spore germination and germ-tube growth at concentration of 960 ppm. Cinamic acid and flavone indicate growth promotion properties.

c) - **Treating *Braula caeca* by different Propolis ext.:** All extracts of propolis (water, ethanol, and acetone) reduced the numbers of honeybee louse (*Braula caeca*), which attaches with queens honeybee. Queens were found free from the lice after seven days from the initial of treatment.

d) - **Effect of Propolis extractions on Seed Germination:** Water, ethyl alcohol, and acetone of propolis extracts and flavone fraction were used in this experiment. Water extract of propolis had inhibitory action in first stages of germination, then germination percent increased. Ethanol and acetone of propolis extract had an inhibitory effect throughout the germination periods of wheat seeds. While flavonoid fraction showed inhibitory effect at the concentration of 4000 and 2000 ppm, but at the concentration of 1000 ppm, the germination percentage was higher than in the control in wheat seeds. The seedling length of wheat showed that at the concentration of 1000 ppm and 2000 ppm were more length than the control. While the propolis extraction and flavonoids of 4000 ppm were less than the control. The treating of broad bean seeds indicated that the propolis extracts and flavones showed an inhibition on the germination than the control; ...

BEES - WAX:

The experiments showed that the amounts of bees-wax extracted were 97.02%, 76.13%, 48.02% and 39.04% for one-year old, two-years old, three-years old combs and over-three-years old respectively. The amounts of bees wax obtained from a comb over three-years old were nearly similar weight of two new foundation sheets of wax. So we mentioned that the using old combs as economic source of crude wax and propolis in the apiary. While the amounts of propolis could be extracted from old combs is higher than the propolis obtained from the new combs, with an average of 1.60%, 2.62%, 41.70% and 64.42% for one-year, two-years, three-years and over-three-years, respectively.

2- Estimating Propolis and Bees Wax amounts at the different parts:

Our experiments indicated that the bees-wax extracts from the upper part of the comb was more than the middle and lower parts. While for the amounts of propolis extracts the middle part was higher than the other parts.

1- Stored Pollen Activity:

The present study showed that, stored pollen in June and July give more amounts of pollen during a year of study, while less amounts recorded in December and January. F1 Italian-bees stored more pollen than the F1 Carniolan bees.

2- Relationship between Pollen gathering activity and Propolis collection activity:

Data indicated that the F1 Italian bees collected the largest amount of stored pollen 2946.02 ± 2.69 g of propolis, while F1 Carniolan bees collected 2191.21 g of stored pollen and 14.17 g of propolis in spring. The amounts of stored pollen and propolis collected were 2413.31 g, 57.2057 g and 14.074 g in 2009 g for F1 Italian bees. These results were more than the Carniolan F1 hybrid bees.

3- Pollens found in Propolis extracted:

In this experiment the photographic of propolis extracted indicated that the different pollens found in the propolis, some of each was found to be digested. Therefore, it can be concluded that honeybee products such as propolis, bees-wax and stored pollen has their great importance either to honeybees themselves or to the human being. The present work has through

the light. Especially upon certain aspects of propolis which previous researches had partially neglected. I hope, that the coming years will show us more and more about those secondary products included in the resin and also about other products of the marvelous creature. "The Honeybee"