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Analysis of the Effects of Insulation of Hive by Plywood and Increase of Wood Diameter on the Population and Production of Honey

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ABSTRACT

An appropriate hive is one of the important factors in rising and preservation of bees. A suitable hive protects bee colonies against cold, heat and sun ray to decrease honey consumption, rapid growth of colony, increase of population, increase of collection of ambrosia, and more product. Selecting the best hive for raising honeybee, the number of newborns (colony population) and production of honey in the hives used by bee owners (common hive) and three types of insulated hives are analyzed. The diameter of the hive wood used by bee owners is two CM. The floor and ceiling of the hive is insulated by plywood, and for insulating the wall of the hive, this diameter of the wall wood increased to 3 and 4 CM. the results indicated that the insulation of wall and ceiling of the give with plywood increase the number of the newborns of the colony population to 40.6% in summer and production of honey to 20.5% though the increase of the diameter of the wood of the hived did not have any effect on the number of newborns of colony and honey production

Keywords: Honeybee, Internal Heat of Hive, Number of Newborns

INTRODUCTION

Honey production and other productions of hive including pollen, beeswax, toxicant and royal jell are tiny components of honeybees benefits. The main benefit of this insect is its incredible ability in pollination of plants. Since a large body of agriculture, gardening and natural resources depends on honeybees, the extinction of this insect on the planet earth causes severe disorders. Bees are raised to produce honey and other hive products that lead to benefit of pollination as well. Increasing the capacity of honey production by reforming bees' habitant (hive) causes the development of rising and preservation of this useful insect [1].

Honey is the most important product of hive. Increasing honey product and other products of hive requires that hives have a large and strong population. Weak population does not have production and they are sensitive to diseases and pests.Even worst, they are deteriorated in winter. Several factors play a role in the increase of the population of hives. Raising newborns by honeybees is one of the factors.Providing sufficient heat for the newborns by the population of honeybees is crucial in the growth and development of them [2].

The temperature of the raising area in honeybees hive is incredibly constant all through year and all through day which is about 34-35 degree centigrade. Whenever the internal air of hive becomes cold, bees consume honey and produce metabolic heat that causes increase of temperature of the internal of hive. Whenever the internal air of hive is hotter than 35.5 centigrade, bees stand on frames to circulate the internal air by quick moving of their wings to send the air outside of the hive to pull the external cold air to decline the internal temperature of hive to the suitable temperature of 35 centigrade degree. If this is not effective for declining the internal heat of hive, some bees fly outside to bring some water [3]. They decline the temperature by splashing the water with high pressure as tiny particles by quick movement of their wings .In addition, the bees who are in the hive get separated from each other and scatter while some gather in the external part to decline temperature.

In the condition of direct shining of heat and sun to the ceiling of hives in summer, the temperature of the internal area of hive increases due to the inability of bees to ventilate the internal air.Thus, beeswax and combs is melt due to the heat, the internal honey flows and pours on the floor. This attracts other bees and their despoliation. Also, the ultra-heat of the hive, bees have early birth which causes damages.

Decreasing of heat causes lengthening of the time of baby growth .They are mostly born abnormal or malformed after their growth period. Increasing the internal heat of hive causes immediate death of babies.Keeping a constant temperature on internal of colony is crucial to control some diseases which are caused by decline of temperature. Some dangerous diseases such as European Luke and virus disease of larvae bag only appear in tensioned colonies.
All the activities inside hives are performed by various beds based on their age and physiological condition in a natural colony and in a normal condition. Ininformalcondition, different bees may leave their main work and hold the responsibility of each activity in their colony based on their power [4].

A suitable hive with minimum heat transition and minimum influence of improper weather condition has a remarkable role in managing the population of honeybees to provide the internal heat easily. This performance has a positive effect on the performance of the population and production of hive products. Hence; it has a positive influence on pollination of plants and preservation of environment.

In this research, the effects of insulation of hive is studied by the help of plywood and increase of wood diameter and honey production in four attendances to determine their effects comparing with each other and the witnessed group on the performance of honeybee population.

MATERIALS AND METHODS

The time and location of performance of the project
This project was performed from the first of May to the 20th of August in 2016 in Eastern Azerbaijan province in Sarab city. This city is 1765 above the sea level, and in terms of geographical feature are 37 degree and 45 minutes and 15 minutes in northern length and 47 degree to 47 degree and 56 minutes in eastern length.

Research Methodology
This test was performed by a totally random statistical plan on 16 honeybee colonies with 4 attendances and 4 repetitions as follow:
Attendance 1 (witness attendance): the thickness of hive wall 2 CM, the thickness of hive wall 2 CM
Attendance 2: the thickness of hive wall 2 CM, the ceiling and floor have plywood
Attendance 3: the thickness of hive wall 3 CM, the ceiling and floor have plywood
Attendance 4: the thickness of hive wall 4CM, the ceiling and floor have plywood
Explanation: The thickness of the walls is the same in all the hives and the thickness of the wood of floor and ceiling is 2 CM in all the attendances.

The practices on colonies
At the beginning of May in 2016 with the start of honeybees activity in an Apiary with the capacity of 600 colonies,16 colonies were selected which were the same in terms of population, the age of queen, newborns, the color of hive (blue),and the amount of honey for each hive was similar. Attendances were specified to 16 colonies randomly, and colonies were transferred to new colonies, and the management of all colonies started and continued with similar condition.

The visiting to the colonies was conducted by the researcher. All the colonies were fed daily with 200 cc one-to one juice (made by adding one weight of sugar to one weight of water) from the beginning of May to the 20th of June.These colonies were not fed from 21st of June (concurrent with saving honey) to the 20th of August (End of Project).Not any single drug was given to the colonies during the performance of the project, and tendency and production of baby hive was not observed in the colonies.

Measuring the infant colony
The numbers of infants of colonies were determined by measuring the level of eggs, larvae and pupae in combs in terms of square centimeters .The number of newborns in each colony was measured at the end of June and 20th of August. Themeasurement at the end of June determined the effects of attendances in heat preservation of hive and the measurement related to the 20th of August determined the effect of attendances in preservation of colony against the heat of sunshine.

Attendances 1 Attendances 2 Attendances 3 Attendances 4

Figure1. The transferring of honeybee colonies to the testing attendances

Measuring the produced honey of colonies

When adding frames containribbed wax into hives, the weight of frames along with the ribbed was is measured and noted on the frame.The weight of each comb was calculated 3.5 gr for each CM square of covered honey comb .Considering the above, themeasurement of honey production of colonies was calculated at the end of honey saving season on 20Th of August as follow.

The weight of honey for each colony= the weight of honey for combs without infants+ the weight of honey for combs with infants

The weight of honey for combs without infants= the weight of combs without bees- the weight of frames with ribbed wax

The weight of honey for combs with infants= a level of comb which is covered by honey $(cm^2) * 3.5\ (gr)$

Statistical analysis

The findings of test were analyzed statistically after required measurement based on a totally randomly statistical model.

Yij = μ + Tj + eij

I: indicated repetition for each attendance
Tj: related variance as the effect of various attendances
Eij: variance of test errors
Sas9.2 computer program was used forstatistical analyzing of data and Duncan multiple range tests was employed for comparison of the averages.

RESULTS AND DISCUSSION

The number of infants of colony

The number of infants of each colony was measured and analyzed in two stages.

The number of infants at the end of June

The obtained data from the measurement of number of infants in the colonies at the end of June based on CM square meter is as the following table1.

Table 1. The number of infants of attendances at the end of June

Attendance / Repetition	Attendance 1(witness)	Attendance2	Attendance3	Attendance4
Repetition1	3265	3494	4483	5827
Repetition2	4572	4835	3964	4690
Repetition3	4170	3602	4561	3500
Repetition4	3409	4529	3583	5145

The statistical analysis of data determined that there was not a significant difference between attendances and the resulted difference can be due to testing errors.

The number of infants of colonies in the 20th of August

The achieved data related to the measurement of infants inside colonies on 20th of August based on CM square meter is table2.

Table 2. The number of infants of attendances on 20th of August

Attendance / Repetition	Attendance 1(witness)	Attendance 2	Attendance 3	Attendance 4
Repetition1	1221	1686	1590	1686
Repetition2	932	1541	1102	1378
Repetition3	1158	1257	1484	1527
Repetition4	1125	1792	1764	1620

The analysis of data determined that there is a significant difference between attendances in the probability level of 95%.Table 3 illustrates the comparison of the average of the number of infants of various attendances on 20th of August.

Table3. Comparison of average of number of infants of attendances on 20th of August

Attendance	Attendance 1	Attendance 2	Attendance 3	Attendance 4
Average	1115/8 [b]	1569/0 [a]	1485/0 [a]	1552/8 [a]

Averages which have common letters do not have significant difference.

The comparison of averaged indicate that the number of infants of attendance 1 (witness attendance) has significant difference with other attendances that means that the number of infants in hives which have plywood in their floor and ceiling (attendances 2-3-4) in comparison with hives which do not have plywood in their floor and ceiling(witness attendance) had a remarkable increase.

Also, table 3 indicated that the thickness of the diagonal of hive wall does not have any effect on the number of infants since attendances 2-3-4 which their difference is only in the diagonal of the thickness of hive wall do not have significant difference.

Production of colony honey

The achieved data from the produces honey by the colonies based on gram is as table 4.

Table 4. Amount of produced honey by colonies

Attendance / Repetition	Attendance 1(witness)	Attendance 2	Attendance 3	Attendance 4
Repetition1	16024	17319	19352	18543
Repetition2	15254	14885	16888	15134
Repetition3	13211	18452	20337	19457
Repetition 4	14121	20005	17488	17645

The analysis of statistical data determines that there is a significant difference between attendances in the probability level of 95%.Table 5 indicates the comparison of the average produced honey for various attendances.

Table 5.Comparison of the produced honey of attendances

Attendance	Attendance 1	Attendance2	Attendance3	Attendance4
Average	14653[b]	17665[a]	18516[a]	17695[a]

The averages which have common letters do not have significant difference.

The comparison of averaged indicated that the amount of produced honey for attendance1 (witness attendance) has significant difference with other attendances that means that the amount of produced honey in the hives which have plywood in their flooring and ceiling (attendances 1-2-3) in comparison with hives which do not have plywood in their flooring and ceiling (witnessattendance) had a remarkable increase [5].

Also,table 5 indicates that the increase of the diagonal of the wood of hive wall does not have significant effect in the production of honey since the production of honey for attendances of 2-3-4 which only have difference in diagonal of wall wood do not have a significant difference.

The results indicate that:
1. Insulating of hive with plywood and increase of wood diameter do not have any effect on the number of infants of colony in spring season.
2. Insulating of ceiling and flooring of hive with plywood causes increase of the number of infants of colony in summer season (40.6%) but the increase of diagonal of wood does not have any influence in the number of infants. The increase of number of infants in summer causes that colonies with more population have a better winter, to grow better in spring, and produce more honey with more population [6].
3. Insulating of flooring and ceiling of hives with plywood increases (20.5 %) honey but the increase of diagonal of wood does not have any effect on honey production [7].

Thus, it is demonstrated that when the weather is cool in spring, those colonies which do not have plywood in their flooring and ceiling of their colonies can heat up their colony by consuming their own honey more to produce heat. They devote their honey for raising infants but the heat of summer decreases the number of infants and honey in the colonies where they are not covered by plywood in their flooring and ceiling.

It is recommended to use some hives in raising honeybees which have wood thickness of 2cm in their wall, floor, and ceiling, and their floor and ceiling are insulated with plywood.

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REFERENCES

[1] Araghi, M. (**1987**). Practical bee raising, Translated by Shahrestani, Nematollah, Sepehr publication
[2] Ebadi, R, Ahmadi, A. (**2004**).Raising of honeybee, Donya publication
[3] Gajmerak, V. (**2003**). Honeybee, translated by Esmayili, Morteza, Sahand publication
[4] Ghourbani, K.; Beyranvand, M. &Asadollah, A. (**2007**). Analysis of the effects of insulating of hive with plywood on winter consumption and management of hive, the sixth research seminar ofcountry honeybee.
[5] Golchin, M. &Jalali, I. (**2010**).The analysis of effects of climate elements in the performance of modern honeybee hive of Ahar city, SID articles, No. 29.
[6] Hashemi, M. (**2004**). Raising honeybee, Farhang Jame publication.
[7] Shahrestani, N. (**1986**). Honeybee and their raising, Sepehr publication
Shan, R. (**2005**). Biography of Honeybee, Second volume, translated by Naziri, Yahya, Sobhan publication.