The American Journal of Agriculture and Biomedical Engineering
(ISSN – 2689-1018)
VOLUME 04 ISSUE 10 Pages: 1-8
SJIF IMPACT FACTOR (2020: 5. 34) (2021: 5. 554) (2022: 6. 291)
OCLC – 1121105746 METADATA IF – 7.125
Publisher: The USA Journals

Journal Website: https://theamericanjournals.com/index.php/tajabe

Research Article

DNA ANALYSIS OF MIGRATED AND NON-MIGRANT BEE IN LOCAL POPULATION IN UZBEKISTAN

Submission Date: October 05, 2022, **Accepted Date:** October 15, 2022,
Published Date: October 20, 2022 |
Crossref doi: https://doi.org/10.37547/tajabe/Volume04Issue10-01

Juraeva Dildora Rustamovna
Phd Student Of Beekeeping Department Of Animal Husbandry And Poultry-Scientific Research Institute, Uzbekistan

ABSTRACT

The article presents information about the genetic potential of bees in the local mountain and desert ecotypes of Uzbekistan, their external indicators, and the characteristics of the variability of the number of paired nucleotides that are genetic markers of bees in the local mountain population.

KEYWORDS

Genetic, population, ecotype, molecular, mitochondrial, locus, nucleotide, polymorph, DNA, index, electrophoresis.

INTRODUCTION

Actuality: The uniqueness of the bee family is that no individual in it can independently form a new family. Therefore, bees may have adapted during development to move part of the family with the queen bee. However, migration separation occurs to varying degrees between breeds and certain families. For this reason, beekeeper scientists have been interested in the reasons for the migration of the bee family for a long time and are conducting scientific research.

One of the main reasons why the bee family does not multiply rapidly is that they produce large amounts of brood several times. Also, the growth and development of the bee family, non-observance of the

The American Journal of Agriculture and Biomedical Engineering
(ISSN – 2689-1018)
VOLUME 04 ISSUE 10 Pages: 1-8
SJIF IMPACT FACTOR (2020: 5. 34) (2021: 5. 554) (2022: 6. 291)
OCLC – 1121105746 METADATA IF – 7.125
Publisher: The USA Journals

methods of raising queen bees, mainly the use of migratory queen bees and neglecting the natural climatic conditions of our republic, as well as solving the processes of migration of bee families, are considered to be one of the urgent issues of today.

Therefore, in our scientific and research work, we aimed to take samples of the mother and worker bees that migrated and did not migrate, and examine the DNA sequence, to study how changes in the composition of their DNA sequence affect the migration of bee families.

Research methodology: In 2020-2021, the research work was carried out on bee families in bee-breeding farms in the mountainous Bustanlik district of the Tashkent region. In the research work, bee families were assessed one by one, and families with the best performance were selected. Samples of worker bees from selected bee families were taken and their external indicators were studied.

Also, the DNA structure of the samples taken from the migrating bee families was studied in the modern "Express Biotechnologies" laboratory at Gulistan State University.

Results of the research work: according to the results of our research work, it was found that the external signs of bees in local populations located in the Bustanlik district of the Tashkent region are preserved in accordance with the mountain climatic conditions.

Fig. - 1. The process of determining external indicators of bees in the local population

Table 1 below provides information on the external indicators of worker bees in the bee families of the local population of the beekeeping farm in the Bustanlik district of the Tashkent region.

The American Journal of Agriculture and Biomedical Engineering
(ISSN – 2689-1018)
VOLUME 04 ISSUE 10 Pages: 1-8
SJIF IMPACT FACTOR (2020: 5. 34) (2021: 5. 554) (2022: 6. 291)
OCLC – 1121105746 METADATA IF – 7.125
Publisher: The USA Journals

Table – 1

Exterior indicators of bees of the local population

Кўрсаткичлар	n	lim	M±m	Cv, %
proboscis length	50	6,564-6,814	6,760±1,16	0,84
Head width	50	3.911-4,121	3,978±1,07	1,66
Head length	50	3,288-3,390	3,352±1,66	0,82
3rd tergite length	50	2,462-3,182	2,558±0,60	7,22
Width of tergite 3	50	7,277-8,506	8,211±0,46	4,59
4th tergite length	50	2,193-2,393	2,269±0,47	12,85
Width of tergite 4	50	9,146-9,400	9,280±0,96	0,88
The width of the wax	40	2,390-2,500	2,459±3,41	0,27
Wing length	40	9,071-9,322	9,197±0,45	3,98
Wingspan	40	3,055-3,245	3,143±1,26	1,53
Cubital index (%)	30	1,773-2,233	1,88±0,68	8,64
Weight of worker bees (mg)	30	89,9-108,4	99,06±0,05	0,34

According to the data in Table 1, there were changes in the length of the worker bees, and it was found that its length was increased by 0.2 mm, the width of the head was 3.97 mm, the length of the head was 3.35 mm, the length of the 3rd tergite was 2.55 mm, and the width was 8.21 mm 4th tergite 2.26 mm long and 9.28 mm wide; the wax windows were found to be 2.45 mm wide, with a wing length of 9.19 mm and a width of 3.14 mm. The average live weight of worker bees was 99.06 mg, and these indicators are statistically reliable (R>0.999).

Wing cubital index of worker bees was also 1.88%, as a result, wing cubital index, length and width indicators of worker bees in the local population, horn length, 3rd and 4th tergite width and length, head width and length, live weight It was determined that such indicators are the result of adaptation to mountain climate conditions and are statistically reliable (R>0.999).

Russian scientists managed to conduct molecular genetic studies on bees in the local population. The mitochondrial intergenic locus of AT-polymorphic genes was investigated. It is known that the average number of loci in Central Russian bee breeds and their populations is 600 pairs of nucleotides, while in bees from the southern regions of Russia it is 300 pairs [1.3.4].

Based on this, as a continuation of our research on the external characteristics of worker bees in the local population in the mountainous climate of Bustanlik

The American Journal of Agriculture and Biomedical Engineering
(ISSN – 2689-1018)
VOLUME 04 ISSUE 10 Pages: 1-8
SJIF IMPACT FACTOR (2020: 5. 34) (2021: 5. 554) (2022: 6. 291)
OCLC – 1121105746 METADATA IF – 7.125
Publisher: The USA Journals

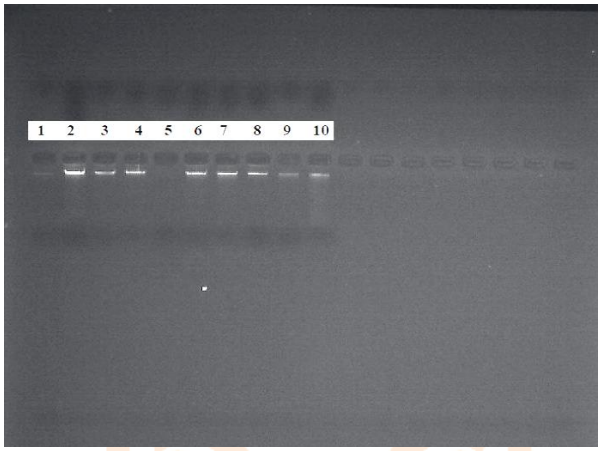
district of Tashkent region, the samples taken from bee families were analyzed by gel electrophoresis in the "Express Biotechnologies" laboratory at Gulistan State University during the migration of mother and worker bees, as well as mother and we managed to study the number of DNA during the non-migration period of worker bees. It was found that the number of paired nucleotides in the samples taken from the mother bees was 612, in the worker bees that migrated - 636, and in the worker bees that did not migrate - 612. In the course of our research, we defined bee families that did not migrate as a control group, and bee families that migrated as an experimental group.

The results of our research showed that in the experimental group, the number of double nucleotides in the organism of bee families slightly increased to 636. It was found that 612 pairs of nucleotides were found in the control group, i.e. families that did not migrate, or 24 more pairs of nucleotides were found in the samples of bees from the experimental group. These indicators showed that the experimental group was 103.9% higher than the control group.

Figure 2. From migrant and non-migratory mother, worker bees DNA extraction process using gel electrophoresis.

The extracted DNA samples were subjected to gel electrophoresis on a 0.9% agarose gel for visual identification.

The American Journal of Agriculture and Biomedical Engineering
(ISSN – 2689-1018)
VOLUME 04 ISSUE 10 Pages: 1-8
SJIF IMPACT FACTOR (2020: 5. 34) (2021: 5. 554) (2022: 6. 291)
OCLC – 1121105746 METADATA IF – 7.125
Publisher: The USA Journals



3 pictures. 0.9% gel electrophoresis method

The presence of DNA was detected visually in all samples except the one in well 5.

1) 1-2 Queen bees (migrated) Experimental group

2) 3-4 Worker bees (migrated) Experimental group

3) 5-6 worker bees (non-migratory) Control group

4) 7-8 Worker bees (non-migratory) Control group

5) 9-10 Worker bees (migrated) Experimental group

PTsR

The reaction mixture in each PTsR contained 1 µl 10x PTsR buffer, 0.08 µl 10 mM dNTP, 0.6 µl 10 µM F-primer, 0.6 µl 10 µM R-primer, 3 µl 25 mM $MgCl_2$, 0.02 µl BZA (BSA), 2 mg 2.5 units of thermostable DNA polymerase Taq (Evrogen, Moscow, Russia) and deionized water (up to 10 µl) and 3 µl of DNA sample.

PTsR mode:

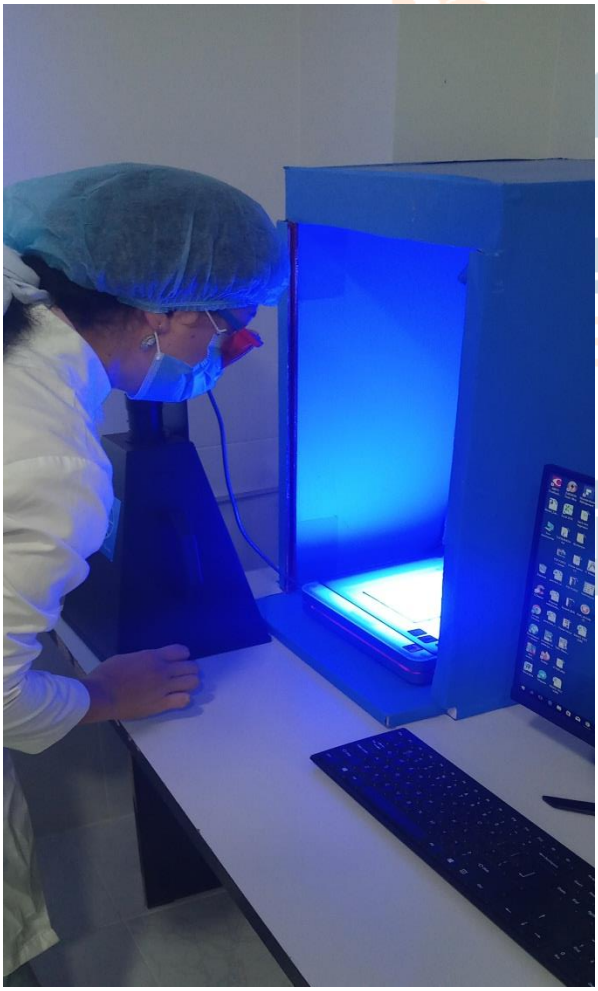
PTsR	T cycle
Initial denaturation at 94 °C for 3 min	1
Denaturation step at 94 °C for 30 s	35
30 s Otjig at 51 ° C 45 s (Elongation) chain elongation at 72 °C	
10 min final elongation at 72°C	∞

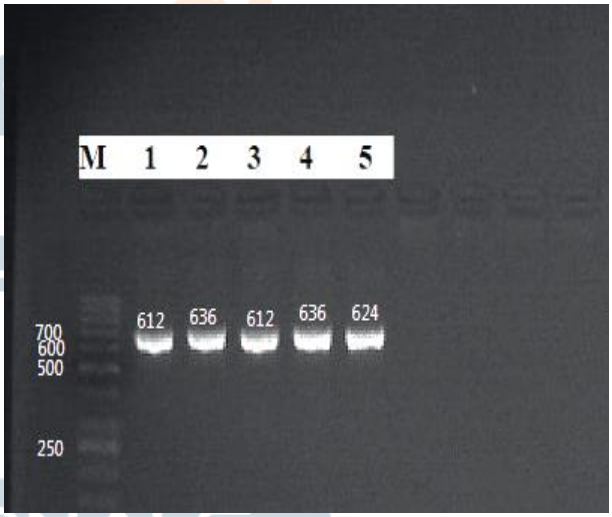
The following primers were used: LepF1, LepR1, CYTB-f, CYTB-r

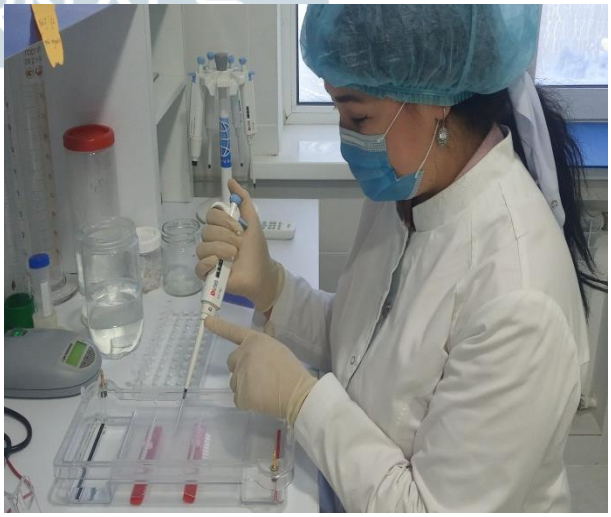
The American Journal of Agriculture and Biomedical Engineering
(ISSN – 2689-1018)
VOLUME 04 ISSUE 10 Pages: 1-8
SJIF IMPACT FACTOR (2020: 5. 34) (2021: 5. 554) (2022: 6. 291)
OCLC – 1121105746 METADATA IF – 7.125
Publisher: The USA Journals

Name	Sequence	Direction
LepF1	ATTCAACCAATCATAAAΓATATTΓΓ	Forward
LepR1	TAAACTTCTΓΓATΓTCCAAAAAATCA	Reverse
CYTB-f	TATΓTACTACCATΓAΓΓACAAATATC	Forward
CYTB-r	ATTACACCTCCTAATTTATTAΓΓAAT	Reverse

PTsR products were separated by electrophoresis on a 2% agarose gel and stained with ethidium bromide. The size of PTsR products was determined using 50 bp DNA length standards (Evrogen, Moscow, Russia). LepF1, LepR1 primer showed 1 sample 612bp, 2 sample 636 bp, 3 sample 612 bp, 4 sample 636 bp, 5 sample 624 bp. However, the amplification efficiency with the CYTB-f and CYTB-r primer pair was found to be very low.







The American Journal of Agriculture and Biomedical Engineering
(ISSN – 2689-1018)
VOLUME 04 ISSUE 10 Pages: 1-8
SJIF IMPACT FACTOR (2020: 5. 34) (2021: 5. 554) (2022: 6. 291)
OCLC – 1121105746 METADATA IF – 7.125
Publisher: The USA Journals

Figure 3. Visualization of separated DNA in Gel electrophoresis

Table 2 shows the variation in the number of pairs of nucleotides in the genetic markers of bees in the local population of the experimental and control groups.

Table 2

Bees in the local population characteristics of variation in the number of pairs of nucleotides in genetic markers

№	Number of Gel electrophoresis	Groups	Bee families	The number of pairs of nucleotides
1	1-2	Experimental	Migrating queen bee	612 pairs
2	3-4	Experimental	Migrating bee	636 pairs***
3	5-6	Control	Non - emigrating queen bee	612 pairs
4	7-8	Control	Non - emigrating bee	636 pairs***
5	9-10	Experimental	Migrating bee	624 pairs**

** *R>0,999*
*** *R>0,999*

According to the data in Table 2, the number of DNA pairs of displaced mother and worker bees in the experimental group varied from 624 to 636 pairs of nucleotides. However, it was found that the number of DNA pairs of non-migrating mother and worker bees in the control group was 612 pairs. In this case, it was found that the number of pairs of DNA pairs of the mother and worker bees in the experimental group increased by 12 and 24 pairs of nucleotides, i.e. from 1.8% to 3.7%, compared to the number of pairs of DNA pairs of the mother and worker bees in the control group.

As a result of our research, studying the tendency of bee families in the control and experimental groups to migrate showed that before the migration of the bee families, as a result of physiological changes in the organism of the mother and worker bees, changes in protein nucleotides in the DNA of the cells that store information, that is, the number of double nucleotides in the cells of the mother and worker bees that did not migrate It was observed that there was an increase in the number of DNA.

CONCLUSION

the results of our research showed that one of the reasons for the tendency of bee families to migrate or to migrate is the physiological changes that occur in the organism of the mother and worker bees before migration, and the increase in the number of protein

The American Journal of Agriculture and Biomedical Engineering
(ISSN – 2689-1018)
VOLUME 04 ISSUE 10 Pages: 1-8
SJIF IMPACT FACTOR (2020: 5. 34) (2021: 5. 554) (2022: 6. 291)
OCLC – 1121105746 METADATA IF – 7.125
Publisher: The USA Journals

pairs of nucleotides in the DNA that stores genetic information in bee cells. proved.

REFERENCES

1. Ilyasov R.A., Poskryakov A.V., Nikolenko A.G., The role of single-nucleotide and gene vitollogenin in the identification of dark forest bees. j. Beekeeping 2015, № 3, p. 22-24.
2. Krakhotin N.F. "Beekeeping in Uzbekistan" Tashkent "Mehnat" 1991.
3. Krivtsov N.I. and others 2011. j. Beekeeping. №, p. 22-24.
4. Syramatnikov M.Yu., Kokina A.V., Burmistrova L.A., Boradachaev A.V., Papov V.N. Differentiation type bees on the analyze genetic for cytochroma B. j. Beekeeping, 2016, №. 10, p. 20-22.
5. Turaev O.S., Salyamov S.J., Methods of rapid development of the bee family in Kashkadarya region. J. "Zoology", 2011, №. 8, p. 42-43.
6. Turaev O.S., Salyamov S.J., Ormanov Sh.Sh., Ikramov B.K. "Bees in the local population of Uzbekistan". Proceedings of the international scientific and practical conference. Samarkand 2012, p. 172-174.
7. Turaev O.S. Save genetic potential and ecotype of local bees in the conditions of mountain in Uzbekistan. XII international scientific and practical conference. 2017, February.
8. Yamaltdinov Sh.G. Bees of Uzbekistan, 1981, №. 7, p. 43.