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Effectiveness Of Using Phacelia Plants In Increasing Bee Productivity

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Abstract:
Annotation: *The article provides information on the use of phacelia plants rich in nectar, the chemical properties of phacelia honey, the periods of bee landing on phacelia flowers, the chemical composition of phacelia pollen, and how to increase honey productivity in bees.*
Keywords: *Phacelia, plant, seed, soil, seedling, fertilizer, fertility, bees, phacelia honey.*

INTRODUCTION:
Like other sectors of agriculture, a number of positive developments are being carried out in the development of beekeeping, which is considered its main sector. In particular, the President of the Republic of Uzbekistan No. RP-3327 dated October 16, 2017 "On measures for the further development of the beekeeping industry in our Republic" and the Resolutions of the President of the Republic of Uzbekistan No. RP-120 dated February 8, 2022 "On approval of the Program for the Development of the Livestock Sector and its Sectors in the Republic of Uzbekistan for 2022-2026", which are the legal basis for the sustainable development of the beekeeping industry, also set out tasks for the development of the beekeeping industry, such as increasing the volume of honey production from 25 thousand tons in 2021 to 52,5 thousand tons by 2026, or more than doubling it.
To accomplish this task, first of all, nectar-producing areas for bees are needed. When creating these areas, it is necessary to plant nectar-rich plants and strengthen the food base for bees . In order to increase the honey productivity of bees, it is possible to increase the productivity of bees by planting nectar-rich fat selia crops in a timely manner and with proper care . This project submitted for the competition will be implemented as part of the program to implement the instructions of the President of the Republic.
Phacelia is an annual plant brought to our country from the American continent. Depending on the species, phacelia can be an annual or biennial herbaceous plant. It grows from 50 cm to 1 meter and is a herbaceous, highly branched plant. Its leaves are bright green, densely located on the stem. Its flowers are small, bluish-white in color, and exude a delicate pleasant aroma. The corolla consists of five petals, protruding from a long corolla. In wild species, the flowers can be pink or purple. The fruit is a capsule, containing about 700 small seeds per gram. For rapid germination, the seeds should be buried 1,5 cm deep. The sown seeds germinate after 10 days. The flowering period lasts from 22 to 56 days. The more fertile the soil, the longer the Phacelia plant will bloom and release nectar and pollen. [17].
Today, many species of phacelia are grown as ornamental plants, as protein feed for livestock, as green manure (gumus) and as rare honey-producing plants. To create a continuous honey feed base, phacelia plants rich in nectar can be planted in three periods: the first - in the earliest period, the second - a month after the first, and the third - in the interval a month after the second. Phacelia plants in the first planting period are considered to have the highest honey yield. Phacelia plants rich in nectar bloom from June to September and provide nectar until late autumn.
This type of honey from the phacelia plant is very similar to linden or acacia honey, so it is easy to confuse them if you do not know which plant the honey comes from. However, after organoleptic tasting, you will be sure that this is phacelia honey, because its sweet, delicate taste and pleasant, fragrant aroma are comparable to other honeys. The taste is delicate, slightly sweet, but not too clear. Due to the high concentration of fructose, the honey crystallizes very slowly. Phacelia honey is also famous for its beneficial properties. The presence of vanadium, potassium, calcium, cobalt, nickel, manganese, strontium, chromium, zinc and even silver in its composition indicates its healing properties [7].
Phacelia honey is very rich in vitamins, amino acids, and also consists of 80% disaccharides, fructose and glucose. It strengthens the human immune system, improves digestion and generally normalizes the functioning of the human body. Honey from the Phacelia plant is valued for its antipyretic, antibacterial and analgesic properties, and also has a positive effect on the cardiovascular and nervous systems and improves

lymph flow in the human body.

The phacelia plant is classified as a phytosanitary plant in the world. Its stem contains a large amount of phytoncides, due to which the plant is not damaged by pests and parasites. One adult plant usually has 200-400 flowers. This indicates the great popularity of the plant among beekeepers. Phacelia is very well protected from sunlight when extracting nectar, and it never dries out. Thanks to these properties, bees can collect nectar from it without much effort in any weather, even in hot weather. According to D.R. Jurayeva, T.P. Akhmedov (2024), the average honey yield of phacelia is 300 kg per hectare [10].

The first to bloom, rich in nectar, the flowers are considered the best in terms of nectar yield. Surprisingly, despite the fact that phacelia honey is recognized as one of the most honey, people do not know much about it. However, it contains about 300 macro and microelements that are useful for the human body. Due to the high fructose content, the taste of honey from the phacelia plant is very pleasant and sweet.

The purpose of the study is to determine the effectiveness of using the phacelia plant in increasing the productivity of the bee family.

Research methods. The research was conducted in the field experimental farm of the Scientific-Research Institute of Livestock and Poultry and in bee colonies of the farm "Gulomkhozha asalchiligi". The bee colonies of this farm served as the control group, and the bee colonies belonging to the Research Institute of Livestock and Poultry served as the experimental group. The research was carried out according to the experimental design.

During the project, the vegetation periods of the planted phacelia plant were continuously monitored and scientifically studied. The composition of nectar and pollen obtained from the phacelia plant, and the chemical composition of honey obtained from the phacelia plant were studied in laboratory conditions.

Before conducting the research, the parameters of bee colony growth and development were studied, and the bee colonies were individually monitored, evaluated, and graded (A.N. Burenin and G.N. Kotova 1997).

The organization of research groups in bees was carried out in a comparative manner, and the study was carried out based on the methods of V. Brovarsky, Sh. Suyarkulov (2021).

The changes in the experimental bee colonies, the number of bees and brood in the hive, the age of the queen and the number of daily egg laying, the number of frames in the hive, its quality, and the amount of feed were carried out according to the method of the Institute of Beekeeping (G.F. Taranov 1971). The strength of the bees in the hive was calculated as the number of passages between the frames.

The strength of the bee colonies in the control and experimental groups was measured and calculated every 12 days using a frame-grid. Each cell in the frame-grid has a size of 5x5 cm, and 100 bee colonies are located in each cell, and the strength of the colony is determined even when measurements are made up to three times during this period (36 days) (V.V. Malkov 1985).

In the experimental groups, the honey yield of bees was determined by number of products obtained from the bee colony during the year. In this case, each bee frame was weighed using a hand scale, and the weight of the frame from which honey was obtained was subtracted from it. The honey yield of the bee colony was calculated according to the method of the Institute of Beekeeping. The wax yield of the bee colony was determined using new frames built on the basis of wax curtains. In this case, wax scraped from the walls of the beehive, on the frames, and wax caps formed from the frames during the honey extraction period, during the opening of the honey cover, were also taken into account (G.D. Bilash, N.I. Krivsov, 1991).

The determination of plant nectar was based on the method of E.K. Liventsova.

The economic efficiency of the research was determined by determining the difference between each cost incurred in the experiment and the product obtained.

All digital data obtained during the research period were processed using the biometric variation statistics method (Ye.K. Merkuryeva, 1984).

Research results: Primary materials for planting phacelia were prepared. For planting phacelia, a mixture was prepared in a ratio of 2:1:1, that is, 2 parts soil, 1 part sand, and one part manure (compost). Phacelia seeds were sown in cups with the prepared soil.

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Figure 1. Soil preparation and phacelia seed planting process

To the glasses cultivated phlox plant daily watering got up and after the 7th day, sprout come out research has begun. take to go in the process phacelia in the plant phenological observations with transfer together, regular strangely from grass clean went. Phenological observations take mainly leaves on the plant number, length, diameter such as studying the dimensions went. After planting the phacelia plant After 14 days, its height (length) 7-9 cm what organization 20 days after planting the Phacelia plant, its height is 10-12 cm what It was observed that the organization.

To the glasses cultivated phacelia plant to the prepared land for the field planting for first of all, the earth area prepared. This for separated land area was expelled, yes taken and compost (organic) was sprinkled and the phacelia plant planting for prepared. Ready was land to the field to the glasses cultivated phlox plant planted exited and irrigated. Phenological observations take gone, stranger from grass cleaned stood up.

Despite the frequent changes in air temperature in the conditions of the Tashkent region (wind, short-term precipitation, cloudy weather, low temperatures), the Krainka bees in the experiment were able to quickly adapt to such temperatures, and the bees developed quickly.

The queen accelerated the daily egg laying of the bees, provided the bee colony with daily nectar and pollen. Our studies have shown that the active flight of the bees in the experiment is directly dependent on their air humidity and sudden changes in air temperature. The average daily flight activity of the bees in the experiment over three measurement periods (3 minutes) is presented in Figure 2 below.

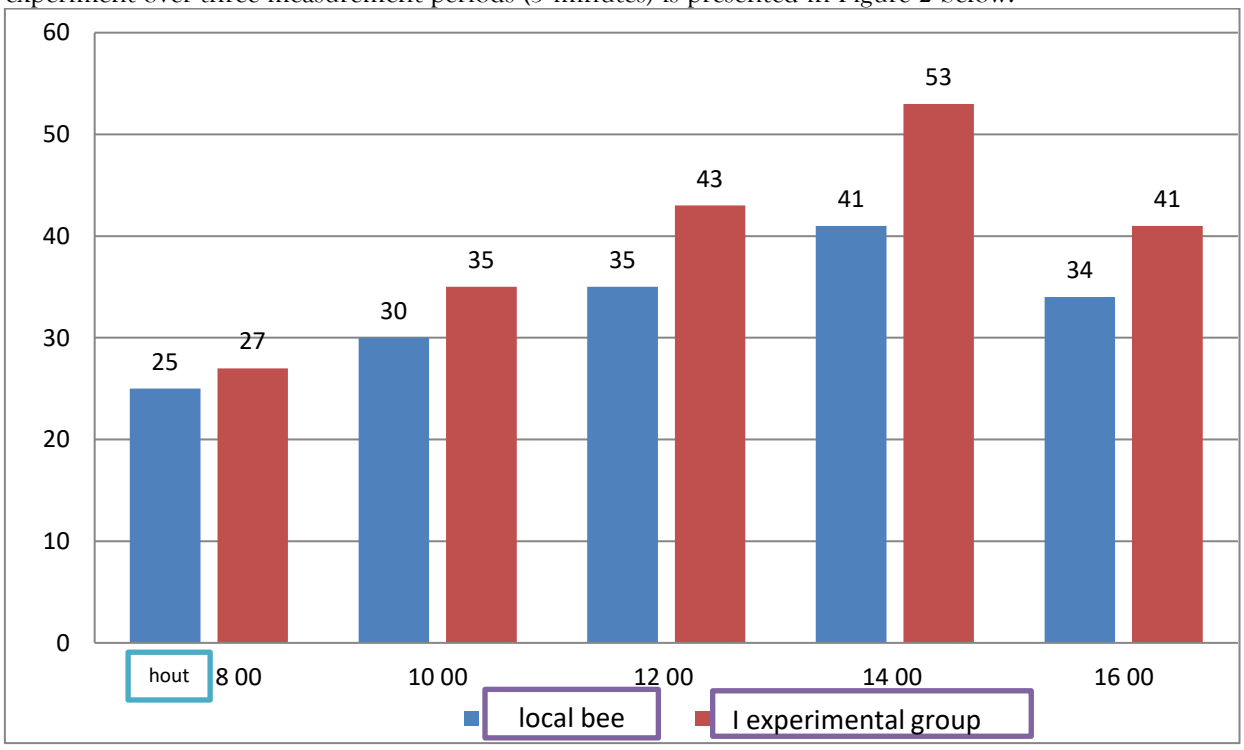

Figure 2. Daily flight of bees

2 showed that Krainka bees flew out of their hive 199 times during the day, while local bees in the control group flew out of their hive 165 times during the same time period. As a result of the study, it was found that bees in the experimental group flew out 34 times more than bees in the control group, or 120,6%.

Figure 3. Bees daily flight activity determination process

As shown in Figure 3, the daily foraging activity of bees on phacelia flowers varied between 8:00 am and 4:00 pm. The highest foraging activity was observed between 12:00 pm and 4:00 pm.

During the flowering period of the phacelia plant, the queen bees are daily egg laying

The higher the number of offspring a queen bee has, the more fertile, young, and healthy she is. The younger and healthier the queen bee is, the more likely she is to establish several healthy and productive colonies in the future. The queen bee is the individual who unites and manages the entire colony.

The presence of healthy and active queen bees in the colony ensures that the colony is a whole, and the efficiency of the worker and male bees is increased. If there is no queen in the colony., the worker bees in this colony will try to find a new queen and provide the colony with queen bees. As a result, all individuals in the colony can perform their work efficiently and on time , creating the basis for a highly productive colony .

The daily egg laying of queen bees was studied based on the method of the Institute of Beekeeping G.F. Taranov. First of all, to measure the amount of brood, a 5×5 wire grid was prepared on the beehive frame, and the closed brood (eggs) were placed on the frame, measured, and each cell was multiplied by 100 and divided by 12 to determine the daily egg laying of queen bees.

Figure 4. The amount of offspring and exterior indicators identification process

During the research, we also studied the daily egg laying process of queen bees in the control and experimental groups. The data on this are presented in Table 1 below.

Table 1
Those in the experimental groups bees daily to lay eggs level

Groups	n	lime	X±S_x	Cv, %
Control group	10	790-799	794±1,01	3,2
Experiment group	10	800-810	804±1,9	6,1

The data presented in Table 1 show that the daily egg laying of queens in both groups was 799 eggs in the control group, while the queen bees belonging to the local population in the experimental group Krainka bees laid the highest number of eggs per day, 810, or 10,0 eggs more than in the control group, which is 101,2%. The daily egg laying of queens in the experimental groups was slightly higher than in the control group .
Also studied the length of the proboscis, one of the exterior indicators of worker bees in the control and experimental groups, and the data on this are presented in Table 2 below.

Table 2 Indicator of the length of the proboscis of worker bees

Groups	n	lime	X±S_x	CV, %
Control group	10	6,2-6,7	6,4±0,05	0,16
Experiment group	10	6,5-7,0	6,8±0,07	0,2

Table 2, it can be concluded that the experimental group The length of the proboscis of the Krainka worker bees was found to be 0,3 mm longer than that of the local population of control workers. Another good feature of the proboscis length is that it allows the worker bees to pierce the proboscis deeply into the nectaries of the flowers during the nectar collection period from phacelia flowers. As a result, the worker bees were observed to collect more nectar from phacelia flowers.
Bee colonies were placed in the area where the phacelia plant was planted. As a result, the bees worker phacelia from the plant pollen and flower he cried. Assembled flower worker bees by again worked, honey, pollen and to the point converted. Research during bee in their family's observations take went and honey caps after closing, that is honey after packaging, after cooking after bee from their family's honey to take for equipment prepared.

Figure 5. Honey to take for need to be equipment

Figure 6. Honey extraction process

Chemical composition of honey and pollen from the phacelia plant

Uzbekistan's natural climatic conditions, its geographical location, are characterized by a wealth of species of honey, nectar and pollen-producing plants. Also, the flora of the republic requires the development of beekeeping and the expansion of its area, in addition to the planting of nectar-producing perennial plants throughout the season, in order to strengthen its food base.

Different natural climatic conditions in the regions affect the organoleptic characteristics and chemical and physical properties of polyflora and monoflora bees, causing them to differ sharply from each other.

For this purpose, we studied the honey productivity of bee colonies placed in a place where phacelia plants were planted at the field experimental farm of Scientific-Research Institute of Livestock and Poultry located in the Kibray district of Tashkent region. In order to study the chemical properties of phacelia honey, we separately took honey from the honeycombs to obtain samples. When obtaining Phacelia honey, we separated 300 g of honey from the honeycombs and their cells using special spoons and took it for analysis.

We studied the chemical composition and organoleptic characteristics of honey and pollen from the Phacelia plant in the laboratory of the Research Institute of Agrobiotechnologies and Biochemistry at Gulistan State University. Data on the amino acid characteristics of honey are presented in Table 3 below.

Table 3 Amount amino acids of honey from phacelia flowers (100 g/mg)

No.	**Amino acids**	**Phacelia honey, t difference group**	**Sunflower honey , n harassment group**
1	Alanine	0,26	0,20
2	Aspartic acid	0,67	0,52
3	Arganine	0,08	0,05
4	Glycine	0,05	0,03
5	Glutamic acid	0,11	0,09
6	Histidine	0,27	0,20
7	Valine	0,80	0,60
8	Mezin	0,19	0,16
9	Laytsin	0,08	0,05
10	Methionine	4,04	3,01
11	Insulation	13,51	12,11
12	Proline	0,89	0,79
13	Serene	0,75	0,63
14	Tyrazine	0,75	0,65
15	Asparagine	1,40	1,30
16	Threonine	0,35	0,31
17	Phenylalanine	0,29	0,21
18	Cysteine	0,10	0,09
19	Glutamine	0,06	0,04
20	Tryptophan	0,16	0,14
Total		24,91	21,26

From the data in Table 3, it can be seen that the amount of alanine amino acid in honey collected by bees from the phacelia plant was 0,26 mg per 100 g of honey, while in other sunflower honey it was 0,20 mg. Similarly, the most abundant amino acid was methionine, which was 4,04 mg in the experimental group, while it was 3,01 mg in the control group, or 1,03 mg less than in the control group.

It was also found that the amino acids isoleucine and proline were 0,10 mg higher, serine was 0,12 mg higher, and arginine was 0,10 mg higher. The remaining amino acids were also 0,5-0,7 mg higher. In addition to studying the diastase activity, which is one of the main indicators of phacelia honey, water content, weakened sugar and sucrose substances, and acidity level, the physical properties and organoleptic indicators of honey were also studied.

For this purpose, the main indicators of honey, such as color, smell, taste, degree of crystallization (sedimentation), viscosity (consistency) of honey, were also studied. It was found that the studied phacelia honey has a unique soft and delicate unique sharp smell. This smell is not found in other types of honey, because phacelia honey is collected only from the nectar of the same phacelia flower, and therefore it has a characteristic smell characteristic of the phacelia plant.

In order to study the quality of phacelia honey, honey was collected from frames of the bee colony using a special spoon during the flowering period of the phacelia plant. The chemical composition of phacelia honey was also studied. The data on this are presented in Table 4 below.

Table 4 Chemical composition of phacelia honey

Indicators	n	Experience group	Control group
Water amount, %	10	17,0	17,9
Weakened sugar amount	10	82,5	84,2
Diastasis number In the GOTE unit	10	15,4	15,0
Sucrose	10	75,4	72,5
Acidity level	10	4,5	4,7

Table 4, it can be seen that the water content of Phacelia honey was 17.0% in the experimental group and 17,9% in the control group, or the amount of denatured sugar was 82,5% in the experimental group and 84,5% in the control group. The diastase number, one of the main quality indicators of honey, was also 15,4 units in the experimental group and 15,0 units in the control group.

Phacelia pollen was studied in the laboratory of the Research Institute of Agrobiotechnologies and Biochemistry at Gulistan State University to study its amino acid composition. The chemical composition of phacelia pollen is presented in Table 5 below.

Table 5 Amino acids of pollen collected from phacelia flowers composition (100 g/mg)

No.	Amino acids	Experience group	Control group
1	Alanine	0,26	0,20
2	Aspartic acid	0,67	0,52
3	Arganine	0,08	0,05
4	Glycine	0,05	0,03
5	Glutamic acid	0,11	0,09
6	Histidine	0,27	0,20
7	Valine	0,80	0,60
8	Mezin	0,19	0,16
9	Laytsin	0,08	0,05
10	Methionine	4,04	5,04
11	Insulation	13,51	12,11
12	Proline	0,89	0,79
13	Serene	0,75	0,63
14	Tyrazine	0,75	0,65
15	Asparagine	1,40	1,30
16	Threonine	0,35	0,31
17	Phenylalanine	0,29	0,21
18	Cysteine	0,10	0,09
19	Glutamine	0,06	0,04
20	Tryptophan	0,16	0,14
Total		24.91	21,26

From the data in Table 5, it can be seen that the amount of lysine amino acid in the pollen of the experimental group was 0,08 mg, while this figure was 0,05 mg in the control group. Similarly, the amount of histidine in the pollen of the experimental group was 0,29 mg, while this figure was found to decrease in the pollen of the control group, like other amino acids, to 0,20 mg.

The most abundant amino acids in Phacelia pollen were methionine and isoleucine, which were 0,44 mg in the experimental pollen and 5,04 mg in the control pollen. Similarly, it was found that isoleucine was 13,51 mg in the pollen of the experimental group, while this indicator was 12,11 mg in the control group. Some organic amino acids were 13,51 and 12,11 mg in Phacelia pollen, while this indicator was 14,51 mg in the control pollen. Similarly, it was found that the pollen contained glycine amino acid by 10 mg, and amino acids such as methionine, valine, and cysteine by 10-20 mg more than in the control group.

Conclusion. it can be said that by planting plants rich in nectar, in order to strengthen the food base for bees and increase the honey productivity of bees, along with timely planting of the nectar-rich phacelia crop, it can also be used in animal husbandry to create a juicy food base for livestock and as a green siderate fertilizer to increase soil fertility. As a result of proper care of bees, opportunities are created to increase the productivity of the bee colony.

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