



ECOLOGICAL SIGNIFICANCE OF PHEROMONES

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ABSTRACT

This article reveals the essence of the concept of "pheromones" and their biological significance. In the article variants of their application in agriculture for struggle against insects-pests are presented. The definition of term and classification of pheromones and their types are given: feromons of insects, feromons of fish, feromons of vertebrates, feromons of humans, feromons of plants, sexual feromons, anxiety feromons, trace feromons, epidemic feromons and their functions and significance for the representative's organism and the environment as a whole.

KEYWORDS

Chemical ambivalence, pheromone, volatile chemosignals, biological markers, communication, insect pests, dispensers, specific response, behavioral response, feromons of insects, feromons of fish, feromons of vertebrates, feromons of humans, feromons of plants.

INTRODUCTION

The 21st century has become a representative stage in humanity's achievement of high indicators in various fields: economics, politics, healthcare. However, these achievements could not but negatively affect changes in the ecological situation of our planet. Gradually, it began to change and currently there is a destruction of natural processes in various ecological systems and subsystems. Issues of environmental safety within one or several regions have undergone a transformation

and have become global problems, now not only of one state, but of all humanity.

In the current situation, the problems of coordinating human impact on the biosphere, finding safer and more natural alternative means of pest control, creating favorable natural conditions, and achieving harmony in the "man-environment" system are becoming increasingly urgent. In this regard, the President of the Republic of Uzbekistan Sh.M. Mirziyoyev, speaking at a meeting of the heads of state

of the founders of the international fund for saving the Aral Sea, noted that it is necessary to begin to introduce environmentally friendly technologies, to begin the comprehensive introduction of a “green” economy, environmentally friendly, energy- and water-saving technologies. The head of state also initiated the organization of a conference next year with the support of the UN, the World Bank, the Asian Development Bank and the Global Environment Facility, at which negotiations will be held on practical issues of creating a zone of environmental innovation and technology in environmentally unfavorable regions of the world [1]. In the strategy of action for five priority areas of development of the Republic of Uzbekistan for 2017-2021 in subparagraph 3.3. Modernization and intensive development of agriculture refers to the implementation of investment projects for the construction of new, reconstruction and modernization of existing processing enterprises, the widespread introduction of intensive methods into agricultural production, especially modern water and resource-saving agricultural technologies, the use of high-performance agricultural machinery; expansion of research work on the creation and introduction into production of new breeding varieties of agricultural crops that are resistant to diseases and pests, adapted to local soil, climatic and environmental conditions, and animal breeds with high productivity [2].

One of the main factors that have become the root of the destruction of the ecological situation is chemical intervention. The role of chemicals is ambivalent. In other words, in addition to their function in the fight against pests, diseases and weeds of agricultural crops, we should not forget that they are organic compounds that are toxic not only to harmful organisms, but also to humans. In this regard, much attention is paid to the development of the agricultural sector, the means and methods that are used here. New approaches to

protecting plants and food supplies from pests are needed, which would be safer for humans, the object being preserved and the environment. Here it is worth noting the important role played by pheromones [3].

Pheromones are chemical substances released into the external environment by some organisms and causing specific reactions in other organisms that perceive them [4].

Pheromones are one of the types of external stimuli that affect the behavior and physiological state of humans and animals, a complex of special olfactory signals. These are biological markers of their own species, volatile chemosignals that control neuroendocrine behavioral responses, developmental processes, as well as processes associated with social behavior and reproduction. Pheromones contribute to changes in the behavior, physiological and emotional state or metabolism of other individuals of the same species. A group of German researchers led by Adolf Butenandt were the first to discover pheromones. Today, pheromones are widely used in agriculture [5]. In combination with traps of various types, pheromones that attract insects make it possible to destroy significant numbers of pests. The classifications of pheromones are very diverse. One of the most common classifications is the following: insect pheromones, plant pheromones. Insect pheromones. Pheromones are used by insects to provide a variety of signals. Ants, for example, use pheromones to indicate the path they have traveled. Certain odors are used by ants to signal danger, which provokes either flight or aggression in individuals. Human pheromones. The production of pheromones is associated with the apocrine glands (AG) of the skin, with the secretions of other glands and with the microflora of the skin. A high concentration of AF was found in the axillary region, which is considered an

important organ for the production of human odor [5]. The human sense of smell is capable of solving the problem of distinguishing and recognizing people by individual smell and, in particular, allows one to recognize genetically close relatives by smell. The possible role of a man's individual scent in a woman's choice of a spouse or sexual partner is suggested. Smells can control mood and performance, and their impact on the work of programmers is particularly important. The second classification of pheromones is represented by the following group of pheromones: sex pheromones, aggregation pheromones, "alarm" pheromones, epideictic pheromones, territorial pheromones. Sex pheromones are a means of communication between sexual partners. Being isolated individuals of one sex, they induce behavioral responses in individuals of the other sex that promote mating [6].

Aggregation pheromones cause both sexes to concentrate for different purposes. "Alarm" pheromones cause a reaction of flight, hiding, or, conversely, an aggressive reaction and a collective attack on the enemy. Trace pheromones, which are a kind of "paths". Epideictic pheromones are different from territorial pheromones when it comes to insects. Fabre observed and noted how "females that lay their eggs in fruits also deposit mysterious substances in the immediate vicinity of the eggs, which serves as a signal to other females of the same species that they should lay their eggs elsewhere" [7]. Some plants release alarm pheromones when animals graze on them, causing tannin production in nearby plants. These tannins make plants less palatable to herbivores. Many wild plants emit pheromones the moment pests begin to damage their leaves. These substances attract natural enemies of insects - even we can smell these odors while our neighbors are mowing their lawn. Some plants attract pollinating insects not with tasty

nectar, but with cunning. These include, for example, orchids. The bizarre shapes of the petals and sepals of some species resemble the pollinators themselves - bees, butterflies or flies. Thus, an orchid flower from the genus *Ophrys* resembles a bee, bumblebee or fly sitting on it, and also emits pheromones of female insects. Having noticed such an orchid, the male pollinator tries to mate with the flower. Of course, he fails to do this, but pollen sticks to him, which the male then transfers to another flower [4]. There are two main ways to use pheromones against insects. The essence of the first is the possibility of attracting an insect using a pheromone and destroying it before it can detect the natural source of the pheromone. The second way is to saturate the air with synthetic pheromone and thereby prevent the insect from finding natural sources of pheromone [7]. Another aspect of the possible use of pheromones is the establishment of the species composition of insects in a particular field. This can be seen most clearly using the example of a scoop.

Analogues of sex pheromones of many noctuid species have been synthesized. A synthesis sample from VNIIHSZR was used. Observations were carried out in the cotton crop rotation of three farms in the Yangiyul district, as well as in the fields of the Research Institute of Vegetables and Melons in the Tashkent district of the Tashkent region. We used two- and three-component pheromones of the fall armyworm (OS-77 and OS-8), the bollworm (VS-23 and VS-137), the S-black armyworm (SCH-72), the convolvulus bollworm (SV-21), and the cotton bollworm. (HS), meadow fall armyworm (LS). Dispensers with pheromones were placed in triangular traps made of laminated paper, which were placed in the fields at the rate of 1 trap per 1 ha at a height of 25 cm above the plants. The dispensers were renewed every 10 days. Observations were carried out over three years in the fields of

cotton, kenaf, corn, alfalfa, red pepper, tomatoes, and pumpkin. In the examined fields of cotton crop rotation (cotton, kenaf, corn, alfalfa), the bollworm complex, determined using available pheromones, is generally of the same type [6]. However, in some years there were differences, which concerned mainly small-numbered species. Thus, in all areas, the dominant species was the convolvulus moth, the subdominant species were the moth and the winter moth. Convolvulus, winter, exclamation, cotton, meadow bollworms (*Mythimna unipuncta*), as well as gamma bollworm, C-black bollworm, and epsilon bollworm were identified in the cotton field. The species diversity of cutworms in the corn field was somewhat lower: cotton bollworm and bollworm were absent. In the alfalfa field, all cutworm species whose pheromones were used were identified. All types of cutworms, the pheromones of which were used during observations, were also found in the fields of vegetable crops, except for caradrine and fall armyworm. On vegetable crops in the Tashkent region, the number of cutworms was generally higher than on the fields of cotton crop rotation in the Yangiyl region.

According to available data, the generalized economic threshold of harmfulness is considered to be the catch on average of 5 or more moths of the fall armyworm per day (night) with one trap, which corresponds to a caterpillar density of 2.6 – 4.0 individuals per 1 m². With the help of pheromones from other cutworms, a high abundance of other species was established, which in terms of harmfulness is not inferior to the winter cutworm; the total number of detected armyworms far exceeded the generalized threshold of harmfulness established for only one species [6].

Thus, the use of analogues of sex pheromones makes it possible to establish the species composition of armyworms in the fields of various crops, as well as to

identify the total number of pests in a particular field and signal the need for protective measures to regulate their numbers [8]. In both cases, the vital functions of the insect, primarily reproduction, will be disrupted.

Recently, an adaptive agricultural system has become increasingly important, which will reduce the consumption of anthropogenic energy and enhance the vital activity of all beneficial organisms that are part of the agroecosystem.

A big role in this is given to beneficial insects – entomophages. They will help reduce the use of man-made pollutants to the required minimum, and therefore maintain balance in nature.

Familiarization of biology students with the data presented in the article will increase their professionalism and general ecological culture, which in the future, in the process of teaching biology, will influence the formation of the worldview of the younger generation.

REFERENCES

1. Подробно.uz: Агентство новостей. 13 августа 2019 года (Дата обращения 13.08.2019).
2. Указ Президента Республики Узбекистан «О Стратегии действий по пяти приоритетным направлениям развития Республики Узбекистан в 2017-2021 годах» УП № 4947 от 7 февраля 2017 года // Учитель Узбекистана. – Т., 2017. – № 6 (2453). – 10 февраля. – С. 2.
3. Хонходжаева Н.Б., Мадраимова С.М. К вопросу о состоянии почвенного покрова как одной из основных проблем агроэкологии. – Р., 2016. East European Scientific journal, 5 – S. 16-21
4. Джекобсон М. Половые феромоны насекомых / Пер. с англ. – М., 1976.

5. Дмитриева Т.М., Козлов Ю.Т. Феромоны и их роль в биологических системах // Символ науки. – М., 2016. – № 10.
6. Khondhodjayeva N.B. Pheromones and their biological significance // 2019 European science -2-44 (2). – S. 13-16.
7. Лебедева К.В., Миняйло В.А., Пятнова Ю.Б. Феромоны насекомых. – М.: Наука, 1984.
8. Ханходжаева Н.Б., Рославцева С.А. Синтетические аналоги половых феромонов. – М., 1993.// Агрохимия 3 – S. 115-119



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