

ECOLOGICAL SPECIFICS OF THE USE OF PHEROMONE MONITORING IN AGRICULTURE

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ABSTRACT

This article involves of the prospects for the use of pheromones in agriculture as a method of pest control and their advantages over pesticides from an ecological point of view. This article shows the concept of pheromones, their species, as well as their importance for biological species and methods for their possible use for human needs. In modern ecological conditions, this issue is the most acute, and research in this area is very perspective. Pheromones are one of the types of external stimulus that affect the behavior and physiological state of human and animals, a complex of special olfactory signals. These are biological markers of their own kind, volatile chemo signals that control neuroendocrine behavioral reactions, developmental processes, as well as processes related to social behavior and reproduction. Pheromones contribute to a change in the behavior, physiological and emotional state or metabolism of other individuals of the same species. Recently, an adaptive agricultural system has become increasingly as a relevant, which it will reduce the consumption of anthropogenic energy and activate the vital activity of all beneficial organisms that make up the agro ecosystem. On the way, the pheromones play a great role. Pheromones have found their use in agriculture. In combination with traps of various types, pheromones luring insects can destroy significant amounts of pests. The data in the article will increase students' professionalism and overall environmental culture, which in the future, in the process of teaching them biology, will affect the formation of the worldview of the younger generation.

Keywords: Pheromones, pheromone monitoring, anthropogenic factor, pesticides, agro ecosystems, biological markers, species, insects, agriculture.

INTRODUCTION

In the foreign countries of the 20th - 21st centuries “The problem of ecological safety has gone beyond national and regional and has become a global problem for all humanity ... Humanity really felt what kind of threat it was facing, what does result arise the anthropogenic impact to the environmental surroundings” [9]. Intensive human economic activity has put the world on the brink of ecological catastrophes. The human impact to the environment is multifaceted. The main anthropogenic factors that destroy the habitat are: urban growth, mining, road transport, industry, and the chemicalization of agriculture.

In worsening of condition of environment and chemical influence is in the first place. The role of chemical facilities in human life is difficult to overestimate. They are given one of the important places in the fight against pests, diseases and weeds of crops, but the actions of pesticides are never unambiguous. Pesticides that are used in agriculture are organic compounds that are toxic not only to pests, but also for human and animals. A person uses pesticides to destroy a limited number of organisms that make up no more than 0.5% of the total number of species inhabiting the biosphere, while pesticides, when applied, and affect all

living organisms. At carrying out protective measures, pesticides are always directed against populations.

PROPOSED METHODOLOGY

To compare the scoop complex inhabiting agrocenoses of cotton crop rotation and vegetable crops, indicators of their stability were calculated. The indicators used, which are widely applied in faunal studies [2, 4, 10, 11]. These indicators are characterized by independence from the sample size and relatively simple calculation. Species diversity was characterized by Species Wealth index, Shannon index, Pielou Alignment Index and Simpson index.

In order to better understand both components of diversity, we need to build a graph on which on a logarithmic scale to plot the number of individuals (or biomass or productivity) of each species on the Y axis, and on the X axis - a ranked sequence of species from the most numerous (plentiful) to least plentiful. The line, connecting the points or passing close to them, was called Whittaker (1965), the dominance curve is diversity, and Pianka (1978) is the species of significance curve [14, 15, 16].

In addition, to determine the similarity between the components of species in different variants, the Chekanoski-Serensen similarity index and the generality coefficient proposed by Mountford and applied by T.S. Grigorieva and T.N. Zhavoronkova [1].

RESULT ANALYSIS

It has also been established that up to 25% of pesticides, used in agriculture, enter aquatic ecosystems. Water drainage from fields, treated with pesticides pollutes not only small of water basins, rivers, but also estuaries. This problem is quite acute in Uzbekistan region.

Thus, the use of pesticides has negative consequences for individual species and biosenosis in general. Therefore, they are dangerous for the whole environment. The pesticide causes profound changes in the whole ecosystem into which it has been introduced. Often the situation is complicated by the fact that much more pesticides are used than is necessary to kill the pests: the deliberate surplus of field cultivation is explained by “reliability”.

Under the created conditions, problems of exposure regulation are becoming increasingly relevant, rendered by man on the biosphere, finding no less effective and at the same time safe and natural means of pest control, creating favorable natural conditions, and achieving equilibrium in the system of “society - environment” [11].

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 lay the foundation for the comprehensive introduction of a green economy, environmentally friendly, energy- and water-saving technologies. The head of state also has become as an initiator of 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, which will hold talks on practical issues of creating a zone of environmental innovation and technology in environmentally disadvantaged regions of the world [6]. It is the in the strategy of action on five priority directions of development of the Republic of Uzbekistan for 2017-2021 years in subparagraph of 3.3. [5]. The modernization and intensive development of agriculture refers to the implementation of investment projects for the construction of new ones, reconstruction and modernization of existing processing enterprises, the widespread introduction of intensive methods in agricultural production,

primarily modern water and resource-saving agricultural technologies, the use of high-performance agricultural equipment; expansion of research work on the creation and introduction into production of new breeding varieties of 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 environmental situation is chemical intervention. The role of chemicals is ambivalent. In other words, in addition to their function in controlling pests, diseases and weeds of crops, one should not forget that they are organic compounds that are toxic not only to harmful organisms, but also to human. In this regard, much attention is paid to the development of the agricultural sector, the means and methods that are used here. New approaches are needed to protect plants and food supplies from pests, which would be safer in relation to humans, to protect object and the environment. It is an essential to note the role pheromones [8].

Pheromones are chemicals released into the environment by some organisms and cause specific reactions in other organisms that perceive them [3].

Pheromones are one of the types of external stimulus that affect the behavior and physiological state of human and animals, a complex of special olfactory signals. These are biological markers of their own kind, volatile chemo signals that control neuroendocrine behavioral reactions, developmental processes, as well as processes related to social behavior and reproduction. Pheromones contribute to a change 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 discovered pheromones first. Today, pheromones are widely used in agriculture [7]. In combination with traps of various types, pheromones that lure insects can destroy significant amounts of pests. Classifications of pheromones are very diverse. One of the most common classifications is the following: insect pheromones, plant pheromones.

Pheromones of insects. Pheromones are used by insects to deliver a wide variety of signals. Ants, for example, use pheromones to indicate the distance traveled. Separate odors are used by ants to signal a danger, which provokes either flight or aggressiveness in individuals.

Human pheromones. Pheromone production is associated with the apocrine glands (AG) of the skin, with the secrets of other glands and with the micro flora of the skin. A high concentration of AG was found in the axillary region, which is considered an important organ for the production of human odor [7]. The sense of smell of a person is able to solve the problem of distinguishing and recognizing people by individual smell and, in particular, allows you to recognize genetically close relatives by smell. The possible role of the individual smell of a man in expressing a woman's spouse or sexual partner is expressed. Smells can control mood and performance, and their impact on the work of programmers is of particular importance. The second classification of pheromones is represented by a group of the following pheromones: sexual pheromones, aggregation pheromones, "alarm" pheromones, epidemic pheromones, and territorial pheromones. Sexual pheromones are a means of communication between sexual partners. Being isolated individuals of one gender, they evoke behavioral responses in individuals of the other gender that promote mating [12].

Pheromones of aggregation determine the concentration of both genders for various purposes. Pheromones of "anxiety" cause a reaction of flight, harboring, or, conversely, an aggressive reaction and a collective attack on the enemy. Trace pheromones, which are a kind of "path".

Epidiactic pheromones differ from territorial pheromones when it comes to insects. Fabre observed and noted that “the females that lay their eggs in the fruit also precipitate mysterious substances in the immediate vicinity of the eggs, which serves as a signal for other females of the same species that they should lay their eggs in another place” [13]. Some plants give off anxiety pheromones when animals graze on them, which lead to the formation of tannin in neighboring plants. These tannins make plants less appetizing for herbivores. Many wild plants emit pheromones at a time when pests begin to damage their leaves. These substances attract the natural enemies of insects - even we can smell these smells at a time when our neighbors are cutting their lawn. Some plants attract pollinating insects not with delicious 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. So, an orchid flower from the genus of *Ophrys* resembles a bee, a bumblebee or a 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, it cannot do this, but pollen adheres to it, which the male then transfers to another flower [8]. There are two main ways to use pheromones against insects. The essence of the first is that it is possible to attract an insect with the help of a pheromone and destroy it before it can detect a natural source of pheromone. The second way is to saturate the air with synthetic pheromone and thereby prevent the insect from finding natural sources of pheromone [13]. Another side of the possible use of pheromones is the establishment of the species composition of insects in a specific field. This can be most clearly seen with the scoop.

The analogues of sexual pheromones of many species of scoops were synthesized. The synthesis sample was used in the research institute of Uzbekistan. The observations were carried out in the cotton crop rotation of three farms in Yangiyul district of Uzbekistan, as well as on the fields of the Research Institute of Vegetable and Melon Crops of Tashkent region.

During the research we used pheromones of 14 Lepidoptera species, mainly representatives of the family of Noctuidae scoop, as well as representatives of the Pyraliidae family - corn stalk (*Ostrinia nubilalis*) and meadow (*Loxostege sticticalis*) moths. Pheromone analogues were used on the following types of scoops. So, the scoop family was represented by a complex of gnawing species: *Agrotis segetum*, *Agrotis exclamationis*, *Ipsilon* scoop, metal-drop of *Autographa confusa*, scoop-gamma *Autographa gamma*, *Erastria trabealis*, meadow *Mythimna unipuncta*, leaf maize *Mythimna loregi*, excellent *Mamestra suasa*, karadrina *Spodoptera exigua*.

Tashkent region is an old irrigation zone, there is little rainfall, on average 380 mm. Relative humidity during the year ranges from 45 to 75%, soils - gray earth, slightly alkaline. For observation, cotton crop rotation fields were selected: cotton, alfalfa, corn, as well as vegetable crop rotation crops (red pepper, tomatoes, eggplant, alfalfa). Conducted researches will confirm the availability and economic feasibility of using analogues of genital pheromones for fauna researches.

According to available data, catching an average of one trap per day (night) of 5 or more moths of winter moths is considered to be a generalized economic threshold of severity, which corresponds to a density of tracks of 2.6 - 4.0 individuals per 1 m². With the help of pheromones of other scoops, a high number of other species was also established that are as harmful as the winter scoop; the total number of identified scoops far exceeded the generalized threshold of severity established for only one species [10].

CONCLUSION

Pheromone analogues were used on the following types of scoops. So, the scoop family was represented by a complex of gnawing species: *Agrotis segetum*, *Agrotis exclamationis*, *Ipsilon* scoop, metal-drop of *Autographa confusa*, scoop-gamma *Autographa gamma*, *Erastria trabealis*, meadow *Mythimna unipuncta*, leaf maize *Mythimna loregi*, excellent *Mamestra suasa*, karadrina *Spodoptera exigua*.

Recently, an adaptive agricultural system has become increasingly relevant, which will reduce the consumption of anthropogenic energy and activate the vital activity of all beneficial organisms that make up the agro ecosystem. A large role we can count the useful insects as entomophages. They will help reduce the use of technogenic pollutants to the required minimum, and therefore, maintain equilibrium in nature. The data in the article will increase students' professionalism and overall environmental culture, which in the future, in the process of teaching them biology, will affect the formation of the worldview of the younger generation.

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