1. Зеленая экономика, в настоящий момент является неотъемлемой частью развития экономического общества. Она подвержена воздействию ряда принципиальных инструментов.

2. Предыдущий кризис обусловил необходимость поиска новых, экологически чистых, энергосберегаемых технологий, способствующих воспроизведению необходимых ресурсов без использования полезных ископаемых. Этот проект реализуется в странах ЕС и назван «Зеленая сделка.».

3. Пандемия COVID-19 показала, что возможно использовать уникальную возможность реализации зеленой экономики в мировом масштабе, реализуя экологические проекты.

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БИОИНДИКАЦИЯ ЗАГРЯЗНЕННОСТИ АТМОСФЕРНОГО ВОЗДУХА ПО СОСТОЯНИЮ ХВОИ СОСНЫ ОБЫКНОВЕННОЙ

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BIOINDICATION OF ATMOSPHERIC AIR POLLUTION BY THE STATE OF PINE NEEDLES

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Аннотация. В статье рассмотрена биоиндикация атмосферного воздуха в разных районах города. Проба бралась в центре города Екатеринбурга и в спальном районе на окраине. Брались так же хвоинки вблизи дороги в глуби леса. Результаты получились совершенно различные. Проблема загрязнения воздухастановится особенной актуальной в наше время, когда происходит активное использование транспорта и развитие промышленности.

Annotation. The bioindication of atmospheric air in different parts of the cityis considered in thearticle. The sample was taken in the city center of Yekaterinburg and in a residential area on the outskirts. They also took needles near the road in the depths of the forest. The results were completely different. The problem of air pollution becomes especially relevant in our time, when there is an active use of transport and the development of industry.

Ключевыеслова: биоиндикация, воздух, хвоя, результаты.

Key words: bioindication, air, needles, results.

Introduction

The environment plays a very important role in our lives; it is its presence that distinguishes the Earth from other planets in the solar system. The importance of atmospheric air for living organisms is huge and diverse. It is a source of oxygen for respiration and carbon dioxide for photosynthesis. It protects living organisms from harmful cosmic radiation, contributes to the preservation of heat on Earth.

This problem becomes especially relevant in our time, when there is an active use of transport and the development of industry. Millions of cars a day produce thousands of liters of exhaust gases, dozens of factories, produce hundreds of toxic substances released into the atmospheric air.

One of the easiest and most accessible ways to determine the purity of atmospheric air is biondication-determination of the state of pine needles for monitoring air pollution. This method was used in our research.

Bioindicators are biological objects used to assess the state of the environment.

In all cases, when it comes to control, the question arises, what is considered the norm for a particular bioindicator? In some cases, the answer is simple. For example, the appearance of necrotic spots of any shape and size on the leaves of plants is always an indicator of environmental pollution, since they should not normally be present.

That is why we chose the common pine tree for our study.

The aim of the study - is to assess the state of atmospheric air in Yekaterinburg, using the needles of Scots pine.

Materials and Methods of Research

Rendering Internet sources and scientific literature on the point, monitoringand analysis.

Results and Discussion of Research

Scots pine near and far from the road.

Monitoring – a system of observations of the state of atmospheric air, its pollution and non-natural phenomena occurring in it, as well as assessment and forecast of the state of atmospheric air, its pollution. Data on air pollution are important, both for assessing the level of pollution, and for assessing the risk of morbidity and mortality of the population.

To assess the state of air pollution in cities, the level of pollution is compared with the maximum permissible concentrations (MPC) of b-b in the air of populated areas.

1. Climate monitoring

It is carried out on the basis of meteorological studies: measurement of the maximum, minimum, daily and average daily temperature; wind speed and direction; air humidity; atmospheric phenomena – types of clouds, aggregate state of precipitation; state of the underlying surface within a radius of up to 100 m – green or yellowed grass, dry or wet, dusty or not soil, snow, etc.

2. Bioindicational monitoring methods

In these methods, the level of atmospheric pollution with certain substances is determined by the state of the species that are sensitive to pollution. For example, plants may have different resistance to sulfur dioxide. Among higher plants, the most sensitive to sulfur dioxide are coniferous plants, which can be used as a bioindicator.

In forest ecosystems, where trees are not subject to anthropogenic influence, most of the needles are healthy and very rarely have necrotic points of microscopic size. With the increase in atmospheric pollution, the damage to the needles will become more pronounced. The method of determining the purity of the atmosphere for pine needles is as follows: several lateral shoots are selected in the middle part of the crown of 5-10 trees of 15-20 years of age and 200-300 pairs of needles of the second and third years of life are selected. Further, the needles are divided into three groups according to the degree of their damage and are counted. The conclusion is made about the degree of atmospheric air pollution with sulfur dioxide. The places we have chosen vary considerably in terms of anthropogenic load. One is located in the center, and the other in a residential area on the outskirts of the city. The monitoring was carried out in two places – the Arboretum and the Kalinovsky Forest Park. In each place, 10 scots pine trees were selected. 200 needles were collected from the trees. Then they were divided according to the degree of damage and counted.

The following results were obtained in the arboretum:

Table 1

Resultsinthearboretum

Locationoftrees:	Needleswithminordamage:	With yellow and black spots:	With obvious signs of tissue necrosis:
neartheroad	67	95	38

indepth	101	74	25

The following results were obtained in the Kalinovsky Forest Park:

Table 2

Results in the Kalinovsky Forest Park

Locationoftrees:	Needleswithminordamage:	With yellow and black spots:	With obvious signs of tissue necrosis:
neartheroad	149	70	31
indepth	186	39	25

Conclusion

As can be seen from the results, the problem of air pollution is relevant for Yekaterinburg. Air pollution varies significantly in the Arboretum and Kalinovsky Forest Park. Also, the level of pollution increases from the depth of the forest to its periphery; this suggests that the components of car exhaust gases do have an impact on the composition of atmospheric air and can significantly pollute it.

Thus, based on the results of my research, the following conclusions can be drawn:

- The literature on bioindication and air pollution was analyzed;
- The needles of Scots pine are really sensitive to the level of sulfur dioxide in the air and can act as a bioindicator;
- The arboretum is located in a zone of high anthropogenic load, the number of needles with damage here increases significantly, from which it can be concluded that this place has a high level of pollution with sulfur dioxide.

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ВЛИЯНИЕ ПЕРИОДА САМОИЗОЛЯЦИИ НА ПСИХОЭМОЦИОНАЛЬНЫЙ СТАТУС

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