Savenko A.G.

Belarusian State University of informatics and radioelectronics, Minsk, Republic of Belarus

Bioindication of air pollution with the help lichens

Bioindication is based on the law of ecological individuality of species. According to this law, various kinds of organisms react to certain factors of environment differently, including anthropogenic. Advantages of bioindication methods in relation to technical and other methods are in their universality, sufficient simplicity, absence of the big material inputs and the most important thing: bioindication methods can reflect not instant, but a mean annual condition of atmosphere and they also display dynamics of changes well. Among various regular groups of plants the best indicators of air pollution are lichens. They are especially sensitive to carbonic oxide, connections of sulfur, nitrogen and fluorine. On this basis the method of lichenoindication is also developed.

I have conducted researches in Minsk in Belarus since 2006. My work includes both a theoretical part, and a practical one. Its purposes are: to develop and put into practice a new effective method of bioindication, to conduct ecological research and to create an ecological map of one of Minsk districts with the help of the developed method of lichenoindication. The aim of a theoretical part of my work is development of completely new technique of lichenoindication. The aim of practical part is conducting ecological researches of air condition in Minsk districts using the developed technique, and drawing up an ecological map of Minsk districts on the basis of the conducted researches.

For a basis of a technique I decided to take features of lichens vital activity and not to use any difficult formulas which are used in other works. Calculations of an index of air pollution in a technique which I have developed should be extremely simple, but at the same time it should reflect the reality objectively. Considering all these theses, I decided to make the list of criteria of lichens vital ability connected with reaction to air pollution, and to carry out an indexation. And the sum of all indexes with all criteria will define a final index of impurity of the territory on which it will be possible to conclude about the degree of air pollution. As a result, the general list of criteria on which indexes will be exposed, is the following: quantity of lichens kinds, set of degrees of ecological tolerance, the biological condition of kinds, approximate age of kinds, percent of a covering one kind of a substratum by lichen, prevalence of a kind in the given ecosystem, approximate age of a substratum.

Such criteria as degrees of ecological tolerance and prevalence of kinds demanded carrying out additional researches. As a result, help tables had to be drawn up, in which an accessory of concrete kinds to certain classes of ecological tolerance and prevalence were specified for a local ecosystem (Minsk region). The given researches assumed exact definition of specific ecosystem structure.

Then it was necessary to develop system of indexation of the made criteria, i.e. to define gradation of criterion chances on points. For calculation of an index of impurity it is necessary to combine averages arithmetic indexes by each criterion. The sum of these indexes will be an index of air pollution in investigated territory. So, the more an index, the clearer air in an investigated location is. The index equal to zero corresponds to the absolute absence of lichens in investigated area. Then it was necessary to identify areas of air pollution, where a certain interval of a polluted index would correspond to them. For this purpose the optimum period was mathematically calculated, through which numerical borders of zones were allocated. For each zone mid-annual concentration of polluting substances were defined. For map development of pollution different colors were appropriated to each zone. Map drawing up occurred on the basis of an index of pollution received on a certain location, and according to color defined for polluted zones. The received results show that the main sources of air pollution in Minsk are

vehicles, and the most polluted zones settle down round large traffic intersections. It's possible to conclude, that effective solutions to the problem of air pollution can be transitions to non-polluting transport, and redistribution of transport streams so that the basic stream doesn't pass through residential city areas.