

tent of water-soluble antioxidants in the plants under study. The decrease in the antioxidant status of plants and the activity of the photosynthetic apparatus are symptoms of the unsatisfactory state of plants due to the severe destructive effect of automotive pollutants.

The excess of the background content of cadmium in plant samples of agroecosystems is shown. A high negative correlation between the Cd content in plants and their antioxidant status was noted and positive.

The correlation between the content of Cd and the accumulation of anthocyanins. The active accumulation of anthocyanins in cell vacuoles can increase the effectiveness of the antioxidant system in the processes of neutralizing oxidative stress products and contribute to an increase in plant resistance to cadmium [1–2]

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USING THE DOSIMETRIC MODEL FOR CALCULATED DOSES ABSORBED BY REPRODUCTION ORGANS OF PINE TREES

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A 5 year study of Scots pine populations inhabiting sites in the Gomel region of Belarus radioactively contaminated as a result of the Chernobyl accident is presented. In five study sites, ^{137}Cs activity concentrations and heavy metal content in soils, as well as ^{137}Cs , ^{90}Sr and heavy metal concentrations in cones were measured. Doses absorbed in reproduction organs of pine trees were calculated using a dosimetric model. The maximum annual dose absorbed at the most contaminated site was about 140 mGy. Occurrence of aberrant cells scored in the root meristem of germinated seeds collected from pine trees growing on radioactively contaminated territories for over 20 years significantly exceeded the reference levels during all 5 years of the study. The data suggest that cytogenetic effects occur in Scots pine populations due to the radioactive contamination. However, no consistent differences in reproductive ability were detected between the impacted and reference populations as measured by the frequency of abortive seeds. Even though the Scots pine populations have occupied radioactively contaminated territories for two decades, there were no clear indications of adaptation to the radiation, when measured by the number of aberrant cells in root meristems of seeds exposed to an additional acute dose of radiation.

Keywords: radioactive contamination, scots pine, absorbed doses, cytogenetic effects reproductive ability, radioadaptation.

To calculate the radiation dose absorbed by reproduction organs (cones) of pine trees, a dosimetric model was developed. Several layers were defined (crown, under crown, and three soil layers at various depths). Each layer was treated as an infinite thick source. A uniform distribution of radionuclides within each layer was also assumed. To calculate the absorbed dose to the cones from γ -ray emitting radionuclides in a particular soil layer, the above layers were considered as shielding and attenuated a portion of the gamma energy. Doses were calculated for cones located within the “crown” layer. The Taylor form for an accumulation factor was applied to take account for multiple scattering of radiation by the upper layers [1]. For cytogenetic analysis, only seeds of good quality were used. Quality was determined by ease of removal from the cones and visual inspection. Seeds were soaked for 24 h in distilled water at 4°C in the dark to synchronize cell division and provide evenness of swelling at the beginning of germination. Seeds were germinated on damp filter diately submitted for germination. 10–24 slides were prepared of the root tips from seedlings, and 1000–4500 anaphase cells per site, per year, were scored for cytogenetic alterations. Twenty nine years after the Chernobyl NPP accident pine populations growing under chronic radiation show an increased level of cytogenetic effects in root meristems of germinated seeds that increases with radionuclide contamination. The maximum annual dose absorbed at the most contaminated site was about 140 mGy. Occurrence of aberrant cells scored in the root meristem of germinated seeds collected from pine trees growing on radioactively contaminated territories for over 20 years significantly exceeded the reference levels during all 5 years of the study. The data suggest that cytogenetic effects occur in Scots pine popula-

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SOLVING ENVIRONMENTAL PROBLEMS DURING THE WASTE PRODUCTION ACCORDING TO THE STATE WASTE CADASTRE OF THE REPUBLIC OF BELARUS

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In this work the analysis of maintaining and processing of data of the state inventory of waste which is conducted according to the state statistical reporting 1-waste (Minprirody) is carried out. The analysis revealed that it is necessary to develop and implement a system that allows to collect statistical data in the "online" mode, which will solve many problems associated with the collection, processing time, increasing the accuracy and speed of data acquisition.

Keywords: state waste cadastre, state statistical reporting form 1-waste (Minprirody), waste production.

The state waste cadastre is a systematic set of data, including quantitative and qualitative characteristics of waste, information on their use, storage, disposal and disposal. Maintenance of the inventory is carried out in accordance with the resolution of the Council of Ministers of the Republic of Belarus dated 19.06.2010 № 934 "On approval of the Regulations on the procedure of the state waste cadastre" [3].

The initial information for the formation of the inventory are:

- data of the state statistical reporting of legal entities on form 1-waste (Minprirody);
- data of reports of the Ministry of housing and communal services on the implementation of the state plan for the procurement of secondary material resources;
- data of reports of the Ministry of housing and communal services on the amount of solid waste buried in landfills;
- data registers objects for use, deactivation, storage, burial of wastes [1, 4].

The waste inventory consists of the following sections: production waste, municipal solid waste, secondary raw materials, object registers.

The collection of some types of waste information, which was subsequently included in the inventory, began as early as 1993. The registry was created in 2010, and from that moment on, it is a gradual development and improvement. At the moment, the inventory contains information about 12 thousand enterprises (10 thousand – under the section "production waste", another 2000 – under the section "object registers").

The data recorded in the cadastre are regularly used in the work with interested persons – for example, at the request of the Ministry of natural resources and environmental protection, its territorial bodies and other interested persons, various information samples are submitted. The inventory is updated annually.

However, there are a number of shortcomings that have a negative impact on the efficiency of the inventory. The article considers the section of the inventory "production waste", which is formed on the basis of summary data of the state statistical reporting 1-waste (Minprirody) "Report on waste management".

The disadvantages of the section include:

1. Late submission of reports. Legally established deadline form 1-waste (Minprirody) in RUE "Bel RDC "Ecology" – 20 Jan. However, some legal entities, for various reasons, send reports later than this date [2].

2. Frequent violation of filling instructions. Despite the clear requirements for filling out the form 1-waste (Minprirody), many enterprises make mistakes when filling out the report, which are often not possible to correct quickly. In this regard, errors have to be corrected directly by employees of RUE " Bel RDC " Ecology " during the processing of information.