

Effects of antropogenic pollutants on morphological and physiological characteristics of *Rhus typhyna* L. in roadside plantations

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The problem of contamination of the environment with antropogenic pollutants became more and more actual in modern megapolises with developed infrastructure. Vehicle exhaust gases possess the greatest part in the environment degradation in cities, as their portion in the pollution of the soils and air in urban territories is estimated to be 60-71%. Gases from motor car exhaust contain more than 200 different compounds, including heavy metals, thus heavy metal contamination of the environment had become a global problem. In modern ukrainian cities and towns the areas near the road are substantially polluted with lead and cadmium. Woody plants are used as the barrier against the distribution of heavy metals. Plantations was created of fast-growing, decorative and tolerant to the pollutants of wood species provide high aesthetic of plants and optimize the urban territories. *Rhus typhyna* L. is one of more perspetive among introduced species for roadside plantations. However heavy metal toxicity is one of the major abiotic stresses leading to hazardous effects in plant.

The aim of this research paper is analysis of effect the vehicle emissions on morphological and physiological characteristics of *Rhus typhyna* L.

The object of the study was 12-year old *Rhus typhyna* L plants, which had been grown on three experimental plots located at different distances from the highway in Pavlograd (Ukraine). Experimental plots were placed at a distance from 25 to 130 meters from the road. The control group of plants were plased at a distance of 1500 m from the roadway. The plants were measured for length and thickness of annual sprout, number of leaves on it, the content of chlorophyll in leaves and accumulation of cadmium and lead in the tissues of these organs.

The major effects of influence transport vehicle emissions on plants are inhibition of growth and development of morphological structures, suppression of the process of photosynthesis. The growth of woody plant shoots is used as a sensitive marker for plant condition and technogenic tension in the environment. The length of the annual shoots of the trees in the plantations those which were at a distance of 25 meter (plot 1) and 40 meter (plot 2) the highway compared to the relatively clean area decreased by 60.5 and 71.1% respectively. The same significant in plot 3 was not statistically significant. The thickness of the annual shoots of the trees in all plot was not statistically significant.

The number of leaves on a one-year shoot was significantly decreased compared to controls only in plot 1 (86.8% to control). The assimilation surface area was significantly decreased relative to values in the conditionally clean area only in the plants growing at a distance from 25 to 40 meters from the road (78.7 to 85.7% to the control, respectively). This parameter in plot 3 was not statistically significant.

Pollution of air and soils near road by transport vehicle emissions negatively affects plant physiological processes including photosynthesis. Negative effect of the ingredients of motor emissions on chlorophyll content in leaves was identified. The amount of chlorophyll *a* and chlorophyll *b* decreased with decreasing distance from the plantation to the road. The concentration of these pigments was significantly decreased compared to controls in plots 1 (60.0 and 47.0 % to the control, respectively) and plot 2 (77.8 and 81.8 % to the control, respectively). The amount of chlorophyll *a* + *b* in the leaves decreased compared to the control in all plots. The amount of cadmium and lead in the tissues of the leaf was significantly higher than the control values on all plots located near road within the one hundred and thirty meter area.

Thus, the strongest negative effects of phytotoxicants on 12-year old *Rhus typhina* L. plants occurred in plantations in the twenty five-meter zone, which led to deterioration of its decorative quality.