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INFLUENCE SOIL SALINITY ON THE CONDITION AND VITALITY OF STREET WOODY PLANTS, KYIV

O.V. Pikhalo, candidate of agricultural sciences

The results of laboratory tests that characterize the content of solid residue on street urban soils historical part of Kyiv and field observations on its impact on the vitality and woody plants.

Solid residue, street plants, the correlation coefficient, the vitality of plants, the general condition.

Among the many factors that affect the condition and vitality of street plants in the historical part of Kyiv, in the first place is the vehicles that not only poisons the urban air harmful for trees compounds, but also seals and contaminate the soil under the trees, causing them to mechanical damage [4]. There is also a low level of farming planting and care, excessive soil salinity, inappropriate chemical composition of soil biological incompatibility of plants and, as a result, unsatisfactory of plants, namely: necrosis of canopy cover, summer crown defoliation, a high degree of infestation damaged by pests and pathogens, etc.

The aim of the study was to determine the solid residue in the soil at street plants of Kyiv and study its impact on woody plants.

Object of research – woody plants of street plants historical part of Kyiv: *Tilia cordata* Mill., *T. platyphyllos* Scop., *Aesculus hippocastanum* L., *Populus nigra* L., *P. italica* Rosier., *Acer platanoides* L., *A. saccharinum* L., *A. negundo* L., *Sorbus aucuparia* L., *Betula pendula* Roth., *Robinia pseudoacacia* L., *Quercus borealis* Michx., *Fraxinus excelsior* L.

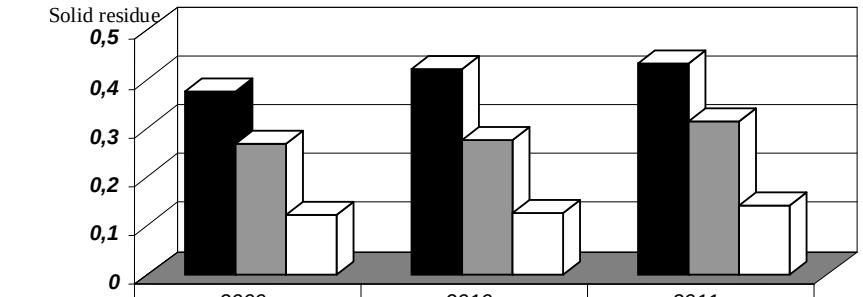
Materials and methods research. Unregulated use of technical salt caused, above all, the negative environmental impacts. There is a weakening and loss of woody plants in the stands that hit the area of the so-called salt factor, because in the winter, to fight ice, using sand-salt mixture, and in some cases technical salt. To determine the content of soluble salts (thick residue) soil samples were taken on

10 streets of the historical part of Kyiv on 30 samples and calculated the salt content in water extracts [1, 5]. In order to identify the content of soluble salts and their dynamics in soils under street plants historical part of Kyiv for three growing seasons (2009, 2010, 2011) conducted three studies (April, July, August). To determine the assessment of the leaf blade and crown methodology V.S.Nikolaevsky [6]. For determination of the proportion and number of live leaves (without necrosis), the latter counted on three skeletal branches of each selected tree, a living area of leaf was determined using a mosaic, and the proportion of live branches in the crown of finding the total number of skeletal branches on a tree. To survey the general state street plants used a 5-point scale assessment of woody plants developed by S.I. Kuznetsov, F.M. Levon, V.F. Pylypczuk, M.I. Shumykom [2].

Results of research. In laboratory studies the first samples were selected after snowmelt in early April, and the obtained results revealed that the currently tight balance in street soils were in the range 0,23-0,64% (table). This remarkably high salt content of most of the studied woody plants and is critical for the literary sources for *Ae. hippocastanum, T. cordata, T. platyphyllos* та *B. pendula* [3]. The following experiments were conducted in July and the results of researches have found that the salt content in selected samples decreased approximately 30% in comparison with April, but the content of soluble salts in the soil (thick residue is 0,18-0,45 %) remains at all research areas. In August, the index decreased salinity of urban soils some samples for another 20-35 %. But the trend in research over the next three years indicate a continuing trend of urban soil salinity during the growing season in street plants of the historical part of Kyiv. Also noticed that the majority of samples annually accumulating solid residue. So on the street Nizhny Val tight balance in April (2009) was 0.37 %, in 2010 - 0.64, 2011 - 0.53 %, on the street Moskovska in April (2009) - 0.32 %, in 2010 - 0.37, 2011 - 0.39 %.

Usually in spring and summer due to leaching of salts of rain water and saline areas rid of excess salt, but all the research areas of dense residue was observed during the growing season (fig. 1). According to a survey in August tight

balance was reduced to a minimum only in some samples (2009-2011 years), selected on the streets of the historical part of Kyiv (0.05-0.09%). The remaining samples mentioned index fluctuated between 0,1-0,20%.



	2009	2010	2011
April	0,374	0,42	0,433
July	0,267	0,274	0,312
August	0,122	0,124	0,14

Fig. 1. Mean solid residue in the soil at street plants of the historical part of Kyiv (2009-2011)

Dynamics of soil salinity in street plants in the historical part of Kyiv

№	Object of research	Location	Thick residue,%									The total assessment of the leaf blade and crowns / general condition of plants, points
			April			July			August			
			2009	2010	2011	2009	2010	2011	2009	2010	2011	
1.	*Ae. hippocastanum*	str. Khreschatyk	0,36±0,012	0,43±0,032	0,41±0,021	0,23±0,029	0,22±0,008	0,22± 0,012	0,09±0,022	0,11±0,007	0,1±0,012	32±0,1/ 3,4
2.	*T. platyphyllos*	str. Volodymyrska	0,40±0,013	0,39±0,015	0,40±0,02	0,27±0,035	0,24±0,010	0,29±0,051	0,15±0,024	0,10±0,006	0,14±0,054	29±0,2/ 3,6
3.	*P. italica* *Ae. hippocastanum*	boulevard T. Shev-chenko	0,42±0,031	0,45±0,026	0,45±0,033	0,3±0,032	0,26±0,016	0,26±0,03	0,11±0,042	0,10±0,009	0,09±0,032	39±0,1/ 4,2 29±0,1/ 3,6
4.	*Ae. hippocastanum*	str. Instytutska	0,29±0,032	0,33±0,043	0,34±0,043	0,20±0,044	0,20±0,012	0,30±0,030	0,07±0,040	0,08±0,003	0,09±0,043	29±0,2/ 4,3
5.	*T. cordata*	str. Saksaganskogo	0,38±0,042	0,51±0,048	0,56±0,033	0,26±0,033	0,33±0,020	0,40±0,044	0,16±0,036	0,18±0,021	0,12±0,038	32±0,1/ 3,5
6.	*P. italica* *R. pseudoacacia*	str. Nizhny Val	0,37±0,029	0,64±0,061	0,53±0,019	0,25±0,041	0,35±0,021	0,45±0,052	0,12±0,028	0,18±0,003	0,1±0,046	39±0,1/ 3,9 37±0,1/ 4,3
7.	*T. cordata.*	str. Kruhlouniver-sytetska	0,23±0,034	0,23±0,024	0,31±0,012	0,20±0,015	0,22±0,011	0,24±0,038	0,05±0,033	0,10±0,005	0,08±0,046	38±0,2/ 4,0
8.	*T. cordata.*	str. Moskovska	0,32±0,038	0,37±0,020	0,39±0,041	0,18±0,029	0,26±0,016	0,32±0,035	0,07±0,05	0,11±0,013	0,09±0,055	36±0,2/ 3,8
9.	*F. excelsior* *S. aucuparia* *B. pendula*	str. Yaroslavska	0,52±0,024	0,40±0,075	0,45±0,034	0,41±0,029	0,37±0,020	0,34±0,011	0,20±0,013	0,16±0,005	0,19±0,049	39±0,1/ 4,3 37±0,1/ 4,1 31±0,1/ 3,1
10.	*T. cordata*	str. Velyka Vasylkivska	0,45±0,028	0,45±0,038	0,49±0,034	0,37±0,038	0,29±0,032	0,30±0,028	0,20±0,036	0,12±0,018	0,18±0,033	31±0,2/ 3,2

The fact of reducing solid residue in the soil in the central part of the city (Khreschatyk , Instytutska) is attributable to the careful maintenance of plants , namely, conducting timely irrigation and aeration of holes trunks , fertilizing and replacement of soil in the hole during the transplant patients and weakened plants. According to the observations found that most woody plants that grow in the street plants of the historical part of Kyiv, sensitive to many factors, microclimate, but significant influence is even slightly saline soil.

To determine the effect of thick residue in urban soils under street plants of the historical part of Kyiv on the general condition and the condition of the leaf blade and crowns of plants were studied correlations. Correlations results indicate that the condition of leaf blade and crown and overall plant performance correlated with soil salinity (correlation coefficient is -0.55, respectively, and -0.54). As a result of studying the correlations revealed that most resistant to salinity were (correlation coefficient is around -0.50): *F. excelsior, P. italica, R. pseudoacacia*, *A. platanoides* і *A. saccharinum*, *P. nigra*, due to the presence of surface branched root system.

Street plants along roads in the historical part of Kyiv mainly grow in holes on the streets, in the so-called standard barrel growth. It is for this type of growth is characterized by a large amount of debris in the holes and the presence of coating around them that limit the space for growth and nutrition of the root system. Also in soils barrel type growth slightly worse-washed rain water so marked that urban soils holes are denser thick residue in August to 15-21% compared to samples that were selected in the bands lawn. Examining the relationship between general condition and the type of street plants in the historical part of Kyiv can state that the plants in the holes worse compared to other types of crops.

Conclusions

In examining the impact of soil salinity on the condition and vitality of street woody plants in Kyiv found that:

1. By increasing the salt content in the soil at the sites of the observations noted deterioration of general condition of plants, the appearance of

necrosis, drying the shoots at the beginning of the growing season, reducing the growing season and functioning machine puff plants.

2. In the study of correlations revealed that soil salinity has a significant impact on the vitality and overall condition of street spaces.

3. Most resistant to salinity urban soils were: *F. excelsior*, *P. italica*, *R. pseudoacacia*, *A. platanoides* і *A. saccharinum*, *P. nigra*, due to the presence of surface branched root system.

4. The worst conditions for the growth of street plants are landing in the "hole".

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