



Indicative parameters of *Plantago major* L. in recreational phytocenoses

Ella Plieva, student; Lyubov Fedorova, senior lecturer; Angelina Streliaeva, PhD, professor

Full name of the speaker *Ella Plieva*

First Moscow State Medical University, Moscow, Russia

Introduction. The condition of the environment is one of the relevant problems of applied ecology, including pharmaceutical one. One of the reconnaissance methods to assess pollution of phytocenoses is bioindication. *Plantago major* L., as one of the indicator species widely spread in the middle lane of Russia, grows in phytocenoses of different anthropogenic loads. At the same time, it is a medicinal plant that is a part of various herbal collections. Non-directional deviations from the bilateral symmetry of *Plantago major* L. leaves may serve as an indicator of the instability of the development of this species and are assessed by the value of the fluctuating

Being a recording indicator, *Plantago major* L. is probably capable of accumulating substances that resist stress. **The relevance of this work** is determined by lack of information about the presence of such substances in leaves in proportion to the fluctuating asymmetry index. **The objective** of the work is to establish a possible correlation between the accumulation of substances in the leaves of *Plantago major* L. and the FA index under the influence of stress factors.



fig.1

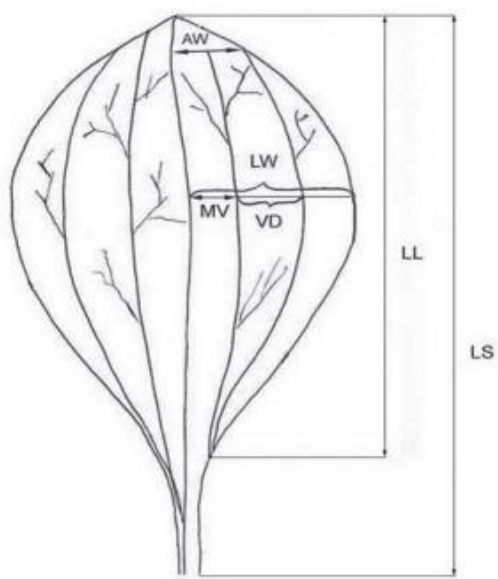
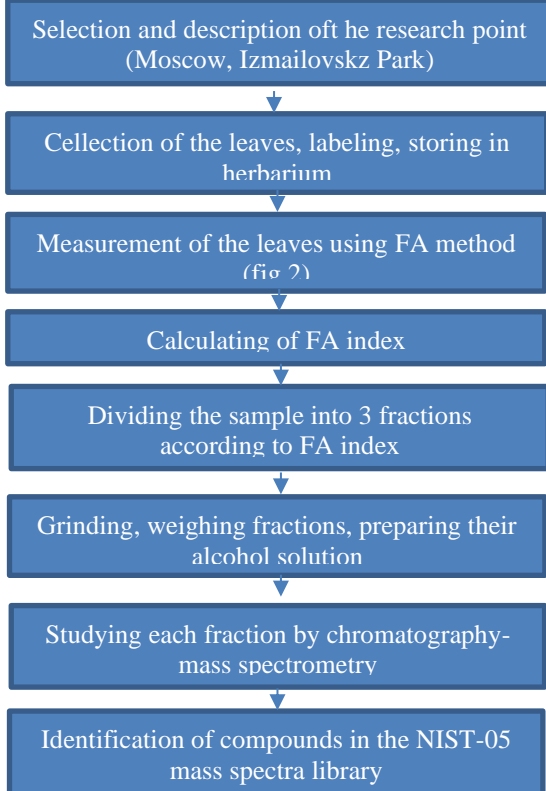


Fig. 2. Diagram of a *Plantago major* L. (sp. *major*) leaf showing leaf width (LW), vein distances within a leaf (VD), the distance from the midrib to the neighboring vein in the left and in the right side of a leaf, measured at a leaf's widest point (MV), leaf-blade apical width (AW), leaf-blade length (LL). These leaf characters are bilaterally symmetrical and only measurements of the right sides of these characters are shown in the diagram. Leaf size (LS) and width to leaf-blade length ratio (LW/LL) are also used leaf characters for numerical analysis.

Research methods



Results. Morphometric analysis of *Plantago major* L. leaves revealed an index of fluctuating asymmetry for the entire sample equal to 0.0629. In fractions the FA score varied: from 0.0047 in the «minimum» to 0.1780 in the «maximum». Qualitative analysis of the sample identified 22 substances, 9 of which were contained in all three fractions with different FA indices. Only the «maximum» fraction contained β -sitosterol. It is known to have a positive exogenous effect on rice plants under the stress factor of UV irradiation (fig. 5). At the same time, despite the stress-protective properties of flavonoids (fig. 4), their quantitative content does not correspond to the FA indices of leaves: most of them are in the «average» fraction, least of all in the «maximum» fraction with the highest FA index.



fig. 3. Chromatography-mass spectrometer

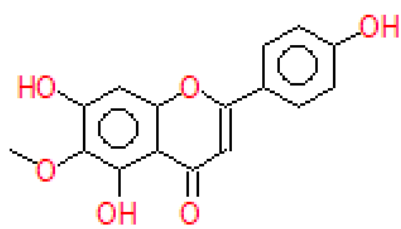


fig. 4. 4H-1-Benzopyran-4-one, 5,7-dihydroxy-2-(4-hydroxyphenyl)-6-methoxy-

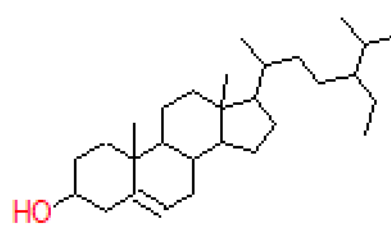


fig. 5. β -Sitosterol

Conclusion. In the future, more complete information about the relation between the developmental instability of *Plantago major* L. in phytocenoses of different anthropogenic loads and the accumulation of substances with stress-protective properties in its leaves will be established.

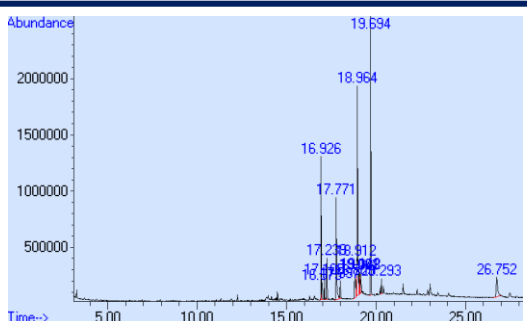


fig 6. fraction „minumum“ chromatogram

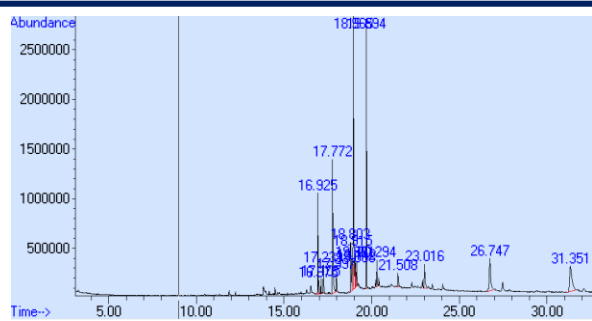


fig 7. fraction „avarage“ chromatogram

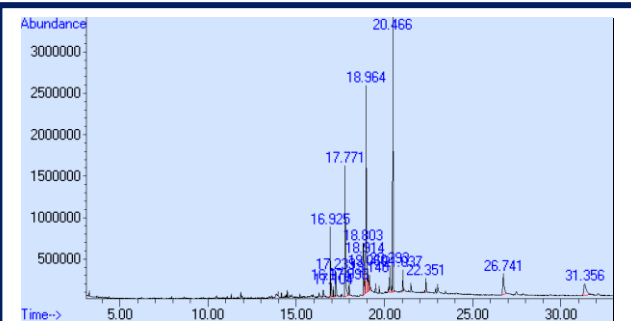


fig 8. fraction „maximum“ chromatogram