THE ECOLOGICAL MORPHOLOGICAL STATUS OF LAWN GRASS UNDER POLLUTANTS INFLUENCE

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Abstract

Update there is not unanimous thought on ecological-morphological mechanisms providing the grasses tolerance in extreme conditions of contaminated environment. Aim of presented research is study of state of the plants ecological-morphological adaptive mechanisms of natural grass cover for creation artificial culturephytocenosis on industrial territory. Thus,. study of growth indexes allows to say about external display of the environment influence on the plant, reflects dependence of internal processes of vegetable organism on ecological factors. In tie with that a sod cover must include gas resistance grasses assortment. In consequence of deep destructive changes of sod plants steppe structures completion in immediate intimacy from emission sources, we consider expedient on elementary stages of vegetable cover forming to use with high decorative species (for example, Poa angustifolia and Festuca rubra) unusual to steppe components, and low decorative ones, for example, Elytrigia repens and Cynodon dactylon, which display high steadiness to industrial contaminants.

Introduction

Analysis of literary sources on sod-forming cereals gas resistance to trow out action of industrial enterprises (1) indicates, that a question this is does not be accorded complex solution. Update there is not unanimous thought on ecological-morphological mechanisms providing the grasses tolerance in extreme conditions of contaminated environment. That's why by aim of presented research is study of state of the plants ecological-morphological adaptive mechanisms of natural grass cover for creation artificial culturephytocenosis on industrial territory.

On basis of the position that main sod-forming grasses used for creation artificial phytocenosis in industrial zones of steppe Ukraine the most frequently are Agropyron pectinatum (Bieb). Beaunv, Agrostis stolonifera L., A. tenuis Sibth., Bromopsis inermis (Leyss.) Lindm, Cynodon dactylon (L.) Pers., Elytrigia repens (L.) Nevski, Festuca pratensis Huds, F. orientalis (Hask.) V. Krecz. et Bobr, F. ovina L., F. rubra L., F. valesiaca Gand, Koeleria cristata (L.) Pers, Lolium perenne L., Poa angustifolia L., P.compressa L., P.pratensis L. These species were picked out as objects for study of morphological indexes changes caused by industrial pollutants. Investigation was carried out by common accepted methods (2).

Results

Seen out analysis of long-term cereals state on the works territory of chemical industry showed in these conditions for Festuca rubra a tendency was found out to rise of leaves quantity on the stem with simultaneous augmentation of its size, lengths and heights of the plant comparatively with Lolium perenne. This can be proof about superiority of this species (Festuca rubra) against Lolium perenne in adaptation to influence of industrial trow out. In the conditions of industrial

environment Festuca rubra takes care high decorative appearance, having the rifle-green leaves and creating dense sod.

Under comparison of morphological Poa angustifolia and Lolium perenne was found out that in conditions of industrial contamination the first species forms the more compact plants than the second ones. Thus, in Poa angustifolia decreasing middle length of the leaf, amount of the leaves on one stem was typical in comparison with the plants of control variant, and also, less of dead leaves and its length than in Lolium perenne, that allows more thrifty to expend water on transpiration (3). More clear difference in morphological peculiarities between both plants displayed in droughty years.

Supply of leaves living parts length of long-term cereals in middle on one stem is a balance of linear growth and dying off (4). That's why for manifold conception about toxicants influence on the plants it be important to investigate its reaction on this level (growth and dying off). In result of carried out research was indicated that in Poa angustifolia increasing of supply of the leaves green parts length of the stem took place, in the main, to July.

Contrary index is balance of the leaves linear dying off. In obedience to our researches its parameter grew from vegetation beginning to its outflow. In the main, leaves dying off intensity is expressed on the territory of industrial enterprises. And too that more environment is contained toxic substances the higher this index. In droughty years intensity of leaves linear dying off almost coincides during vegetation period on territories of the examined works.

Attached to balance consideration of the leaves linear growth in control in Poa angustifolia its maximum always falls down on August. In plants growing on the industrial enterprises territory this peculiarity, in the main, is kept. But in the years with high middle temperature in summer on territory of domestic chemistry works peak of this index is observed on July. Under research of balance of leaves linear dying off was found out gradual reinforcing of this process to the vegetation outflow. It mast be noted that an intensive dying off of the leaves living part in Lolium perenne was attended with intensive length growth of its living part. In Poa angustifolia both indexes have more balanced disposition.

Important integral index allowing comprehensively to estimate a state of vegetable organism (belonging to determined grade of damage in conditions ecological pressure) is estimation of its vital state. Base of this diagnostics is information about the plant habitues, and the first, about leaves size changes and level of its damage. Confirmation of this aspect is calculated by us correlative connections between leave damage level and basic grown indexes of sod-forming grasses (table 1).

It's noted that in conditions of reinforced technogenic pressure the criterions of classification separation change in greater or more less degree in comparison with normal, ecologically relatively clean conditions. That is why there is necessity of creation of suitable scheme adapted to conditions of territories of metallurgical and chemical industry enterprises disposed in Ukrainian steppe area. Linear system of vital plants forms is laid down in base of our suggestions, in which exclusive of other superiorities, to each unit is landed determined symbol allowing in coded form to take care obtained information and to work it by technical methods. It as any linear system is open for additions, specifications and working out in detail without negation previous data contained in the classification systems of hierarchical type.

Table 1

Correlative connection between leaves damage level and basic grown indexes of sod-forming grasses

Decorative signs	Statistic indexes	Gas resistance
Length of the second leaf	R	0,939***
	η	0,968***
	Fg	41,4***
Supply of leaves vital part length	R	0,949***
	η	0,970***
	Fg	34,0***
Balance of leaves linear dying off	R	0,908***
	η	0,944***
	Fg	29,3***

r – coefficient of correlation, η – correlative correlation,
Fg –criteria of flexure,
* - data reliabled at P≤0,05
**- data reliabled at P ≤0,01
***- data reliabled at P ≤0,001

Shown the plants signs are important reacting criterions of living system on ecological factors in different levels of its organization (4). That's why its are taken for object of most attentive supervision. So for technogenic conditions of Ukrainian steppe area we offer to pick out such grades of long-term cereals for each from aforesaid signs:

1. Height of vegetative stem

1.1. Lowermost. A Height of basic mass of vegetative stem is < 10 sm. For example, Agrostis stolonifera

1.2. Shortest (10 - 20 sm). For example, Fectuca valesiaca, Poa pratensis.

1.3. Middle (20 - 30 sm) is Dactylis glomerata, Poa angustifolia. In conditions without technogenic influence this index is equal 20 - 35 sm.

1.4. High (30 - 40 sm) is Elytrigia repens. In conditions without technogenic influence this index is 35 - 50 sm.

1.5. Highest (> 40 sm). In relatively «clean» conditions - > 50 sm. Among studied ones by us in technogenic conditions of such species aren't registered. However, outside doubt, its are.

2. For height sign of generative stem such three well-known grades exist.

2.1. Lowermost. Basic stem mass is < 30 sm. For example, Agrostis stolonifera

2.2. Middle (30 - 60 sm. For example, Poa pratensis, P.angustifolia, Dactylis glomerata, Elytrigia repens. In conditions without technogenic pressure - the stem height intervals of this grade are 30 - 60 sm.

2.3. High (> 60 sm). Among studied by us such aren't aforesaid.

3. Width of leaf plate.

3.1. The narrowest-leafed (< 1,5 mm) is Festuca velisiaca, F. ovina L.

3.2. Narrow-leafed (1,5 - 3,0 mm) - Poa angustifolia, Agrostis stolonifera.

3.3. Middle width-leafed (3,0 - 6,0 mm) is Poa pratensis, Datylis glomerata.

3.4 (6 - 9 mm) - Elytrigia repens, Festuca orientalis.

3.5. The broadest-leafed (> 9 mm). Among studied by us in technogenic conditions such species aren't registered. In conditions without technogenic influence Festuca orientalis belong to this grade.

Conclusion

Thus,. study of growth indexes allows to say about external display of the environment influence on the plant, reflects dependence of internal processes of vegetable organism on ecological factors. In tie with that a sod cover must include gas resistance grasses assortment. In consequence of deep destructive changes of sod plants steppe structures completion in immediate intimacy from emission sources, we consider expedient on elementary stages of vegetable cover forming to use with high decorative species (for example, Poa angustifolia and Festuca rubra) unusual to steppe components, and low decorative ones, for example, Elytrigia repens and Cynodon dactylon, which display high steadiness to industrial contaminants.

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