

THE PHYTOTECHNOLOGY OF IRON-ORE DUMPS REVEGETATION BY CREATION OF STEADY PLANT COMMUNITIES

Mykola Baranets and Halyna Shol'

*Kryvyi Rih Botanical Garden NAS of Ukraine, Kryvyi Rih, Ukraine
shol.flora@gmail.com; kbsnanu@gmail.com*

Disturbed lands of mining landscapes remain a source of negative influence on environment for many years. Revegetation is one of the measures for overcoming such influence, renewing the productivity of these lands after technogenic disturbance and stabilizing their ecological state.

The aim of our work was to develop the revegetation (greening) technology of the iron ore dumps of Kryvyi Rih area by creation of the grassy herbs-fescue-feathergrass communities, which are similar to the zonal biogeocoenotic structures. The objects of our investigation are the herbaceous dominant species of the natural flora of the steppe zone and the species of other areas, which are promising for greening of disturbed lands.

As the result of investigation, we developed the method of iron ore dumps biological revegetation by creation of steady multicomponent grassy communities like natural steppe biogeocoenotic structures. This phytotechnology excludes expensive stage with using of mining machinery, agricultural and agrochemical substrate improvement; also it includes seeding of gramineous grasses, dominants and subdominants of steppe ecosystems.

Different dump types are characterized by various rate of natural overgrowing; we developed relevant models of herbs-fescue-feathergrass communities for each of them. All these models are similar because they contain some gramineous grasses: firstly, species of *Stipa* L. (feathergrass), *Festuca* L. (fescue) or *Koeleria* Pers. (koeleria). Depending on the dump type, other herbaceous species are added. Such species as *Hyssopus officinalis* L. (hyssop) or *Crambe maritima* L. (sea kale) are promising to be included into the composition of the communities. These species are high-yield in the dumps; in the more unfavourable substrates, they can form even monodominant communities. The seeds of *Hyssopus officinalis* were sown at 1 ha 30 years ago; during this period, the species occupied over 3 ha. In some places, the density of *Hyssopus officinalis* reaches 500 individuals per 100m²; all the age groups are presented – from germs to subseniles. Generatively evolved plants are higher than 90 cm and show a good vitality. Mean-aged generative individuals have 20–70 generative shoots per plant; average production of these shoots is 160.2–181.6 flowers. The average seed production is 60% of theoretically possible one. *Hyssopus officinalis* demonstrates the qualities of a pioneer species but it can be displaced gradually by the firm-bunch grass, thus it does not threaten natural steppe species.

Implementation of such models allows excluding initial stages of self-overgrowing in the dumps and therefore to stimulate forming of steady multicomponent plant communities which are similar to the natural ones. When the plants enter the generative period, they become a seed source and expand into new areas due to self-seeding. Any supplementary measure is not needed.

Combination of vegetation cover forming technology at the different iron ore dump types and of process of natural overgrowing enables to significantly reduce the time of substrate consolidation (in loess-like loams – for 15–20 years; in quartzites and shales mixed with loess-like loams – for 30–40 years; in limestones – for 20–30 years); also it permits to achieve significant economic effects of the revegetation in a short time and to minimize relevant costs. Ecologic efficiency of the developed technology is proven at the iron ore dumps of the ore-dressing combines of Kryvyi Rih.

Key words: Phytotechnology, Revegetation, Dumps, Plant Communities, Kryvyi Rih Area