

THE EFFECT OF BIOPREPARATIONS TREATMENT ON POPLAR AND WILLOW SAPLINGS SURVIVAL IN THE RECLAIMED MINELAND

Mykola Kharytonov¹, Mykhaylo Babenko¹, Nadiia Martynova², Margaryta Sbytna³, Yaroslav Fuchilo⁴ and Mykhaylo Gumentyk⁴

¹*Dnipropetrovsk State Agrarian and Economics University, Ukraine*

²*Oles Honchar Dniprovsky National University, Ukraine*

³*National University of Life and Environmental Sciences, Kiev, Ukraine*

⁴*Institute of Energy Crops and Sugar Beet, Kiev, Ukraine*

The most appropriate for mineland reclamation is to search the bioenergy species, able to grow on marginal lands and give stable yields. Some species of the poplar (*Populus* L.) and willow (*Salix* L.) can be attributed to such plants. This is a fast-growing woody energy crops, enabling to create highly productive plantations with a long service life.

This research was carried out under Ukraine steppe zone conditions in the land reclamation area of Dnipropetrovsk State Agrarian and Economic University in the town of Pokrov for two years (2016–2017). In the spring of 2016, cuttings of 9 hybrid poplar and 2 local willow clones have been planted on experimental plots.

The plot substrate was a mixture of loess-like loam and red-brown clay, which had passed through a long-term phytomelioration stage. Four variants of the experiment were laid: treatment with vermicomposting extract (VCE), trichodermin, mycorrhiza and mixture of these three agents.

The survival percentage of 9 poplar clone saplings planted in 2016 was very different between varieties. The worst indicators were observed for the clone Heidemij – only 11%. Clones Tardif de Champagne, Ijzer-5 and Robusta showed a high level of survival (70, 80 and 95%, respectively). For the rest clones, this index varied in the range of 33–5%. By the end of the year the average height of these plants was 80–93 cm, and some specimens reached 170 cm. Clone Dorskamp also showed good growth rates, but bad survivability does not give grounds for the expediency of its further cultivation on marginal soils. The clone Tardif de Champagne, despite the good sapling survival, showed a low growth rate and therefore also lacks a good potential.

According to the results obtained in the first year of cultivation, two clones - Ijzer-5 and Robusta – were evaluated as the most promising and selected for further research. Researches of the second year were devoted to the effect of biological agents on the survival and growth of these two clones. It was revealed that the sapling survival rate of both clones in the control, experiments with vermicomposting extract, mycorrhiza and a mixture of agents was practically the same and amounted to 87–93%. Treatment with trichodermin had a suppressive action, as a result of which the survival of clones Ijzer-5 was 73%, and of clones Robusta was even lower – 66.7%. Treatment of clones Ijzer-5 with biopreparations promoted growth acceleration of all experimental specimens by 10–19%. The clone Robusta responded to the influence of biopreparations by growth intensification from 8.5 to 46%. Measurements of the annual shoot diameter showed that in the clone Ijzer-5 it is 22–30% higher than in the clone Robusta in the control plot and experiments with vermicomposting extract, mycorrhiza and trichodermin, and 4.5% less in the experiment with the mixture of agents. Treatment with biopreparations stimulated the activity of annual shoot lateral meristems in all experimental variants in both clones. The treatment with vermicomposting extract gave the best result for the clone Ijzer-5, and for clone Robusta in the experiment with a mixture of agents.

For clone Ijzer-5 an increase of the leaf area in all experiment variants was observed from 19.5 to 38%. The treatment with trichodermin had the greatest impact. In clone Robusta, quite the contrary, trichodermin caused a decrease in leaf area by 25% compared to the control. In other variants, an increase of this parameter was noted, but less intense than for clone Ijzer-5, only by 13.5–20.5%.

The treatment of the two willow clones root vermicomposting extract has provided greatest influence on the length and diameter of the shoots. In the arid summer of microbiological preparations did not exert additional effect.

Key words: Mineland, Fast-Growing Woody Energy Crops, Biopreparations