

We are unable to supply this entire article because the publisher requires payment of a copyright fee. You may be able to obtain a copy from your local library, or from various commercial document delivery services.

From Forest Nursery Notes, Winter 2011

165. © Application of superabsorbent polymers in the production of Scotch pine (*Pinus sylvestris* L.) and Austrian pine (*Pinus nigra* Arn.) seedlings. Sijacic-Nikolic, M., Vilotic, D., Milovanovic, J., Veselinovic, M., and Stankovic, D. Fresenius Environmental Bulletin 19(6):1180-1185. 2010.

APPLICATION OF SUPERABSORBENT POLYMERS IN THE PRODUCTION OF SCOTCH PINE (*Pinus sylvestris* L.) AND AUSTRIAN PINE (*Pinus nigra* ARN.) SEEDLINGS

Mirjana Šijačić-Nikolić¹, Dragica Vilotić¹, Jelena Milovanović^{2*}, Milorad Veselinović³ and Dragica Stanković¹

¹University of Belgrade, Faculty of Forestry, Belgrade, Serbia

²University "Singidunum", Faculty of Applied Ecology "Futura", Belgrade, Serbia

³Institute of Forestry, Belgrade, Serbia

ABSTRACT

The effect of superabsorbent polymers on Scotch pine (*Pinus sylvestris* L.) and Austrian pine (*Pinus nigra* Arn.) seed germination and the development of 1-year-old- and 2-year-old seedlings were analyzed. The study results show a positive effect of polymers on seedling development of model species, so they can be considered to be a good recommendation for a wider implementation in seedling production of coniferous tree species.

KEYWORDS: polymers, Scotch pine, Austrian pine, seed germination percentage, seedling development

INTRODUCTION

During the 80s of the 20th century, to intensify the agricultural production, American scientists developed the substance called *Super Absorbent Polymer* based on polymers (non-toxic acrylamide), today known under different names (superabsorbent, hydrogel, water-absorbing crystals) and trade names (Horta-Sorb®, Super-Hydro-Grow, etc.), depending on the type and the manufacturer. The first polymer formulations were based on inorganic substances. However, because of the residual substances which remain in the soil after their decomposition, organic polymers are increasingly used nowadays.

The positive experience refers to the application of polymers: as an addition to soil mixtures for plant production and cultivation [1-6], stimulators of seed germination [7, 8], for immersing the bare-root seedlings in long transport, for soil stabilization [9-14], for the stimulation of plant survival and growth in the establishment of tree rows, shelterbelts, and in the reforestation of difficult and degraded terrains in climatically modified environmental conditions [15-20].

The aim of this study was to assess powder polymer (*Water Retainer/Polymers - Hydro Absorption Rate between*

250 and 350) influences on Scotch and Austrian pine seed germination rates and seedlings development in laboratory, greenhouse and nursery conditions as well as to evaluate justification of their application in commercial plant production.

MATERIALS AND METHODS

The increase in forest cover in Serbia is a strategic goal which has been clearly defined and pointed out by the contents of the latest official documents [21]. Special significance is assigned to Scotch pine and Austrian pine, which are most often used in the afforestation of the most unfavorable lands. Based on the research reported by Ranković [22], it can be inferred that the significance of pines in afforestation in the past was somewhat lower than it could be estimated, considering the fact that only the poorest and the most deficient sites are afforested. For this reason, the development of seedling production of pine species is the primary goal of forestry science and profession.

To test the superabsorbent polymer potentials and methods of application in Scotch pine and Austrian pine seedling production, the experiments were established under the conditions of laboratory, greenhouse, and nursery (Fig. 1). The following polymers were tested: *Water Retainer/Polymers - Hydro Absorption Rate between 250 and 350* (Manufacturer Super Absorbent Company, 10 Chrysler, Irvine, CA 92618, www.SuperAbsorbent.com), in powder form. The above polymers are non-toxic, biodegradable, pH-neutral and starch-based.

Experiments in laboratory conditions

The effect of polymers on Scotch pine and Austrian pine seed germination in laboratory conditions was analyzed in the experiment established according to the following protocol:

- g (treatment T1), 0.2 g (treatment T2) and 0.3 g (treatment T3) of polymers were dissolved in 20 ml of water and mixed till the formation of compact solution (gel)