# The role of hydrogel on growth of seedlings under greenhouse conditions

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## INTRODUCTION

This paper presents research within of limestone quarry reclamation in a greenhouse experiment. A major problem is the loss of soil during quarry restoration, when the soil is replaced with a lowquality substrate. Plants may be exposed to repeated stress (e.g. drought stress) (Oliveira et al., 2011). Currently, warming is occurring and plants may experience drought stress more often during the growing season. Hydrogel could be one option to suppress drought stress in plants.



#### **METHODS**

The selected trees were planted in rectangular pots (volume of 10 liters). Three soil substrates were taken from the quarry Mokrá. Soil substrate No. 1 (S1) was soil enriched with crushed limestone, second substrate (S2) was sandy, last soil substrate (S3) was only crushed limestone. The seed material (Pinus sylvestris, Larix decidua, Picea abies, Quercus robur) was from School Forest Enterprise Masaryk Forest Křtiny. Substrates and individual seedlings had different irrigation doses. Minimum irrigation:250 ml,



optimal irrigation: 500 ml, maximum irrigation 750 ml and hydrogel had 250 ml. Hydrogel used was from the German manufacturer Degussa AG, Creavis Technologies Innovation, Backerpfad 25, Krefeld. According to the manufacturer's recommendation was dose of hydrogel 3 g/liter of substrate. Soil moisture was measured once every 14 days before irrigation by ML2 ThetaProbe Soil Moisture Sensor by Delta-T Devices Ltd. The experiment lasted 34 weeks (November -July).

#### **RESULTS**

Soil properties	S1	S2	S3
	47.07	22.00	20.42



Fig. 2 Natality and mortality of pine (a-c), larch (d-f), spruce (g-ch) and oak (i-k) seedlings on substrate S1, S2 and S3



Fig. 3 Growth of the trunk – pine (a), larch (b), spruce © and oak (d) on substrate S1, S2 and S3

#### **CONCLUSION**

Addition of hydrogel to the substrate had no significant impact. While soil moisture increased with the hydrogel substrate, values remained within the range of optimal and minimal irrigation. Only in the case of S3 was there an increase in both minimum and maximum moisture levels compared to substrates with optimal irrigation. Quercus robur seeds germinated earlier on all substrates with hydrogel compared to other irrigation. Different tree species exhibited varying trunk growth increments in the substrates (pine: S1, larch: S3, spruce: S3, oak: S2), but the substrate with hydrogel addition showed the highest increments for all tree species in substrate S1. However, our results emphasize the importance of carefully selecting substrates and tree species, as each species has specific requirements. In the next phase of our research, we plan to conduct a field experiment directly in the quarry using hydrogel.

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